RAILROAD GAZETTE

FRIDAY, NOVEMBER 9, 1900.

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Contributions

Hard and Soft Steel.

Pennsylvania Railroad Company,
Altoona, Pa., Oct. 31, 1900.

TO THE EDITOR OF THE RAILROAD GAZETTE.

Referring to yours of Oct. 30, I hasten to set you right in the matter of hard and soft steel.

I have seen no reason since the Steel Rail papers were published, to change my views in regard to the nature of metal to be used in places where *wear* is the principal element. I still think that mild steel gives better results, so far as wear is concerned, than harder steel, and I think the ultimate studies on this subject will confirm this view. On the other hand, all our experience now for the last ten or fifteen years, is confirming the view that for metal subjected to successive alternate transverse stresses, a harder metal gives better results with fewer breakages, than softer metal. This applies to axles and crank pins, guides, side rods, etc. At the same time our studies on boiler plate indicate that a harder steel than formerly was used, gives best results. In brief, *the work that the metal must do*, is the guiding principle to determine what kind of metal shall be used, and it would be a marvel that one kind of metal should in all places give the best results.

CHAS. B. DUDLEY, *Chemist.*

Points in the History of the Wootten Boiler.

Pittsburgh, Pa., Nov. 5, 1900.

TO THE EDITOR OF THE RAILROAD GAZETTE.

The Wootten boiler, whether "so called" or rightfully entitled to that designation, being now public property so far as patent protection is concerned, the discussion of its novelty is unimportant, except as a matter of historical accuracy, and I do not desire to trespass upon your space in continuing it further than to the brief extent that may be necessary in reply to the editorial of the November issue of *Locomotive Engineering*. The latest expressions of my esteemed friend, the editor of that journal, clearly indicate that he is misinformed, or insufficiently informed, upon this as upon other questions on which he has taken issue with me.

The "main point of our difference" was, as understood by me, the shape of the grate, although, except in the case of extremely free burning fuels, its size is, as I consider, of equal importance, and it is gratifying to have the editor's endorsement of the wide fire-box, even though only to the limited extent that "an approximately square box has advantages in firing." The signs of the times are unmistakably that the wide fire-box has come to stay, and I cannot allow myself to believe that so progressive a journal as that of my friend will allow itself to be considered an opponent of it. As to size, a furnace 8 ft. square (and for better results a larger one) would undoubtedly, for use with anthracite coal, suit me better than one 6 ft. square, which would not suit me at all, but the latter could be made to do fairly well with good bituminous coal, and infinitely better than the same grate area in a fire-box approximating 10 ft. 6 in. by 3 ft. 6 in.

I need no reminder of the facts on the question of the novelty of the Wootten boiler, and long before I was counsel for the Wharton Switch Company in the suit against the Rogers Locomotive Co., referred to in *Locomotive Engineering's* editorial, I was fully familiar with them. That suit, however, had nothing to do with the "so-called Wootten boiler," which was patented July 3, 1877, No. 192,725, and was, as a matter of fact, brought upon a patent granted in 1886, in which the characteristic features of the Wootten boiler, i. e., a wide fire-box, in combination with a combustion chamber and fire-bridge, were conspicuous by their absence. It is therefore clearly impossible that suit could have been brought "in order to make all the locomotive builders pay a royalty for the so-called Wootten fire-boxes they had built," as the patent sued on did not show or claim the structural features of the "so-called Wootten fire-boxes," and it was not supposed or charged that the defendants had built them. The suit was discontinued upon private terms, satisfactory to both parties, and an examination of the record by any one sufficiently interested to make it will confirm my statement that the particular issue involved was wholly foreign to that of the novelty of the "so-called Wootten boiler," or of the validity of the 1877 patent under which it was exploited.

The question of whether or not the difference between the boilers of the engines "Lehigh" of 1854 and "Somerset" and "Hudson" of 1859, and the "so-called Wootten boiler" is "merely a question of design" is one of law, which it would be as unprofitable as inconclusive for us to argue. The fact remains, however, that no one of these engines was or can be pretended to have been "a locomotive engine in which a fire-box wider than and a grate as wide as or wider than the distance between the driving wheels, and arranged above the same, are combined with a bridge, M, extending across the said fire-box, and with the auxiliary combustion chamber, all substantially as set forth." This is the claim of the 1877 patent which covered the "so-called Wootten boiler," and American type passenger engines have been built in accordance with it having driving wheels up to 78 inches in diameter. *Locomotive Engineering* will hardly venture to maintain that American type engines with driving wheels of this or any other diameter suited for passenger service could be built with boilers of the Colburn design.

Whether *Locomotive Engineering* has proved me to be wrong in the contention which I here reiterate, that, other things being equal, a narrow fire-box requires a smaller exhaust nozzle than a wide one; or has, as one of its correspondents airily observes, "ripped me up the back," can properly be left to the judgment of motive power men who have felt sufficiently interested to follow the discussion. The character of fuel used has a bearing, and a most material bearing, on the direct issue, and if any medal is to be awarded it should be a leather one, to anybody familiar with locomotive operation who cannot distinguish by its exhaust a wide fire-box engine from a narrow. In ordinary fairness, when the selection is made, the applicant for the medal should be barred from observing the liberal display of fireworks which is given by the narrow fire-box engines (compound included) on the line of railroad which I understand to be referred to in the editorial.

J. SNOWDEN BELL.

The Organization of a Great Railroad.

In the *Railroad Gazette* of April 27 appeared a sheet showing graphically the organization of the Pennsylvania Railroad, and in our issue of Aug. 31 was a similar representation of the organization of the Erie. The attention which those publications received confirms us in the idea that many of our readers are interested in specific examples of organization, and therefore we feel justified in publishing pretty nearly in full an executive order issued by the President of the Southern Railway, Oct. 21. This gives the organization of the Operating Department of the Southern, taking effect Nov. 1.

SOUTHERN RAILWAY—OPERATING DEPARTMENT.

The *Third Vice-President and General Manager* will be assisted by an Assistant General Manager, a General Superintendent of Transportation, two General Superintendents, a Superintendent of Motive Power, an Engineer of Bridges and Buildings, and a Superintendent of Telegraph.

The *Assistant General Manager* shall assist the Third Vice-President and General Manager, especially in all matters pertaining to maintenance of way and equipment and in the direction of new construction and improvements upon operated lines. He shall pass upon all requisitions for the purchase of supplies for the operating departments and shall also exercise general supervision over supplies and materials on hand in the several departments. He shall keep the Third Vice-President and General Manager informed as to the amounts of supplies used and on hand from time to time in all departments. . . . He shall perform such other duties as the Third Vice-President and General Manager may direct.

The *General Superintendent of Transportation* shall have general supervision of the amount and character of train service, the records of car movements and the distribution of locomotives and cars. It shall be his duty to see that the cars are moved promptly and that they are made to perform the greatest and most economical service possible. He shall supervise the numbering and weighing of all cars. He shall perform such other duties as may be assigned to him by the Third Vice-President and General Manager.

The *General Superintendents* shall have charge of the real estate and personal property of the Company in their respective districts, including . . . all property connected with current operations. They shall be responsible, within their districts, for the safety and efficiency of the transportation service, for the maintenance of track and equipment and for the proper discipline of all employees of the operating departments. They will be held especially responsible for the economical working of their districts in all departments, for the amount and character and cost of the forces employed and the amount of supplies consumed. They will report to the Third Vice-President and General Manager. Each General Superintendent will be assisted by an Engineer of Maintenance of Way.

Operating Districts.—The system will be operated in two districts, each of which will be in charge of a General Superintendent. Eastern District, with headquarters at Salisbury, N. C., will consist of the Washington, Danville, Charlotte, Richmond, Norfolk, Asheville, Savannah and Charleston Divisions. Western District, with headquarters at Chattanooga, Tenn., will consist of the Knoxville, Memphis, Atlanta, Birmingham, Mobile and Louisville Divisions.

The *Superintendent of Motive Power* shall have the supervision of the Motive Power Department in so far as may be necessary to insure uniformity of standards in equipment and of shop practice upon different portions of the system. He shall keep himself informed as to the condition and capacity of the shops and their facilities for the proper maintenance of the equipment of the Company, and make to the Third Vice-President and General Manager from time to time reports and suggestions. . . . He shall furnish to the General Superintendents copies of all standard drawings required by the mechanical department, with such instructions as may be necessary to insure uniformity. . . . He shall keep himself informed as to all leases or purchases of equipment, and keep a record of all the equipment furnished thereunder. He shall keep a record of the numbers and condition of all the locomotives, cars, floating equipment and machinery owned or leased by the Company, wherever situated, and, to enable him to do so, the General Superintendents shall make to him such reports as he may require. He will be assisted by a General Foreman of Car Repairs, whose duty it shall be to keep him promptly and thoroughly advised in all matters pertaining to the general condition of cars in use on the Company's lines.

The *Engineer of Bridges and Buildings* shall have special charge of all bridges and shall keep the Third Vice-President and General Manager advised as to their general condition. . . . He shall prepare such plans for bridges and buildings as may be necessary and furnish the same to the General Superintendents for execution when duly approved, and he shall approve all bridge designs prepared by contractors or others before they are accepted by the Company.

The *Superintendent of Telegraph* shall have charge of the construction and maintenance of all telegraph lines . . . and shall be responsible for the efficiency of the telegraph service. He shall communicate with the Division Superintendents in regard to matters connected with the condition of the telegraph lines. He shall give such instructions to the Division operators as may be required to insure . . . proper working. . . . He shall pay particular attention to the distribution of supplies required by the Telegraph Department, and see that they are used to the best advantage. He shall perform such other duties as may be assigned to him by the Third Vice-President and General Manager.

The *Engineers Maintenance of Way* shall thoroughly inspect, in person, the bridges and all other structures within their districts, and make reports thereon from time to time to their respective General Superintendents. They shall be responsible for the preparation of maintenance-of-way plans (not including bridges), which, after approval by the Third Vice-President and General Manager, shall become the standard, and they shall see that such plans are properly adhered to. They shall perform such other duties as may be assigned to them by their respective General Superintendents.

Division Superintendents shall exercise, on their respective divisions, all the powers of the General Superintendent which may be necessary for the proper and economical operation of their divisions. . . . They will report to the General Superintendent of their district. Each Division Superintendent will be assisted by a Resident Engineer or Roadmaster, who shall have special charge of the maintenance of way and structures, and who shall be responsible to him for the condition of the roadway and structures.

The Operating Divisions will be as follows: [See *Railroad Gazette*, Nov. 2, p. 731.]

Master Mechanics shall report to and receive their instructions from their respective Division Superintendents. They shall have charge of the machine and car shops, and of the maintenance and repair of the locomotives, cars, floating equipment, tools and machinery at their respective shops.

The *Purchasing Agent* shall, under the direction of the Third Vice-President and General Manager, make all purchases of material required for the Company's use, except those otherwise specifically provided for. He

shall make purchases only upon written requisitions, approved by either the President or one of the Vice-Presidents, or by such other officers as may be authorized in writing by the President to give such approval. Contracts for supplies covering a period of more than sixty days, or costing more than $5,000, must have the written approval of the Third Vice-President and General Manager. Such contracts, when made, must be reported by the Purchasing Agent to the President and the Second Vice-President. He shall have charge of the sale of all old materials, equipment and machinery, and shall advise the Auditor and Treasurer in detail of all sales made. He shall keep himself and the Third Vice-President and General Manager (and also the President and other Vice-Presidents when so required) advised as to general condition of markets, probabilities of fluctuation in prices, and delays in deliveries, etc., and he shall when practicable consult freely with the President or the Vice-Presidents on these points before making large or important purchases or sales. He shall give bond for the faithful performance of his duties in such amount as the Board of Directors may determine, and will be held responsible for the economy and efficiency of his department.

American Practice in Block Signaling.*

By B. B. Adams.

VIII.

CONTROLLED MANUAL.—CONTINUED.

The drawings shown in Figs. 20, 21 and 22 are to supplement the description of the Coleman "lock and block" apparatus, being sectional views of the signal lever and of the electric slot. As the frame in a cabin usually contains a distant signal lever and often a number of switch levers, the interlocking of these levers must be

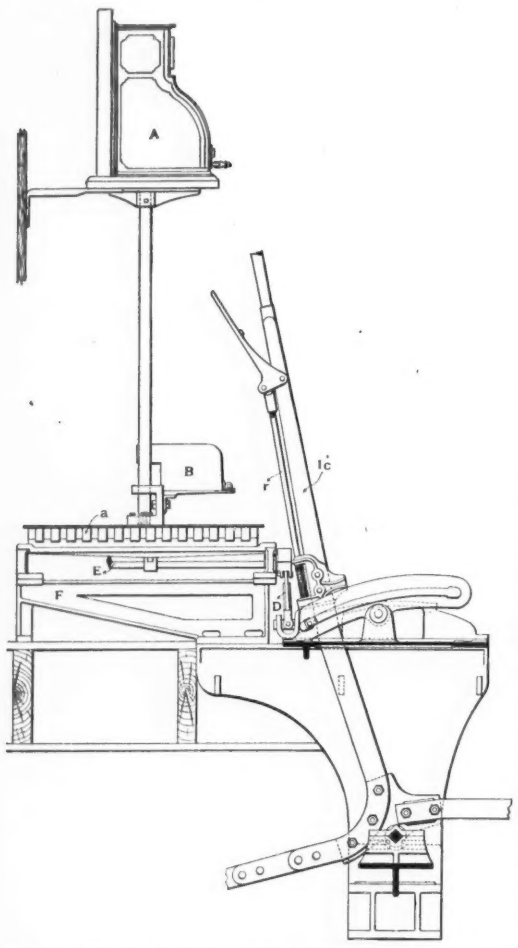


Fig. 20.—Signal Lever with Mechanical Interlocking and Electric Lock.

provided for, to insure that different levers shall always be reversed in the right order. The drawing shows a lever with part of an interlocking frame. The style of interlocking is the "Saxby & Farmer improved," as made by the Union Switch & Signal Co.

The lever is shown in Fig. 20. A is the case containing the principal electrical apparatus and B contains the electro magnet which directly controls the lever 1*c*. This electro magnet is shown in transverse and longitudinal sections in Figs. 20*a* and 20*b*. The letters in these sections, 4*c*, 7*c* and 9*c* refer to the parts indicated by these letters in our description of the electrical connections.

The sector block, 4*c* is controlled by the bar 7*c* dropping into the notch, as shown. A current through the coils of 9*c* lifts 7*c* out of the notch. The sector block controls the lever through shaft E¹ and link D. To move the lever, 1*c*, the signalman must lift the catch rod *r*, but in doing this he must revolve the shaft E, and this cannot be done as long as the shaft is held fast by the locked sector 4*c*.

The view of the shaft at E¹ shows, in part, how the interlocking is effected. The interlocking bars C¹ are supported at the back of the levers on frames *F*. The ends of these bars are shown at *b* and *c*. They slide longitudinally, and are actuated by horizontal transverse shafts E, E¹, when these are revolved on their axes by the catchrod *r* of the lever, acting through the link D, D¹. A shaft, revolved on its axis by its lever, moves an interlocking bar by a short arm, and the sole function of the bar is to be pushed or pulled, a short distance, by the action of its lever catch-rod, so as to obstruct the path of some other bar. If it is desired that the first bar, when pushed, shall obstruct the subsequent movement of the second bar, a dog, with a beveled end, is fixed to the top of the first bar at the proper place to push a block athwart the path of the second. Blocking the second bar holds its shaft motionless, and this in turn prevents the lifting of the corresponding catch-rod and thus prevents the signalman from moving that lever.

The "electric slot" is used to automatically set a signal in the stop position immediately after the passage of a train so as to provide against forgetfulness or neglect on the part of the signalman. It is thus named because its function is similar to the well known slot in the vertical rod, long used in mechanical signaling in England, by which a signal connected, by wires or rods, with two cabins, can at any time be put at "stop" by either signalman without the co-operation of the other.

The electric slot is shown in Figs. 21, 22 and 22*a*. As will be seen from Fig. 22*a* the rod UA, which is moved upward to clear the signal, is carried through an iron box, fixed to the signal post between the signal arm B and the balance lever C. Referring now to Fig. 21, the frame K and the parts attached to it move up and down with the rod. The electro magnet M, when energized, keeps rods U and E rigidly connected and the signalman has full control of the signal. When the magnet is de-energized, the ...ing of the rod U does *not* lift E and consequently has no effect to move the signal arm. Rod U is connected at its lower end to the balance lever and to frame K at J. Frame K supports the magnets, the guide K_1 (Fig. 22), spring L and bolt J and H. Lever G is pivoted to move radially on H. Spring T is fixed to the bottom of the case and presses against roller I, in lever G, normally holding the latter in position shown. Roller N in lever G rests under pawl F, which is pivoted in rod E at X.

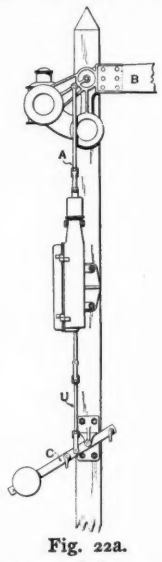
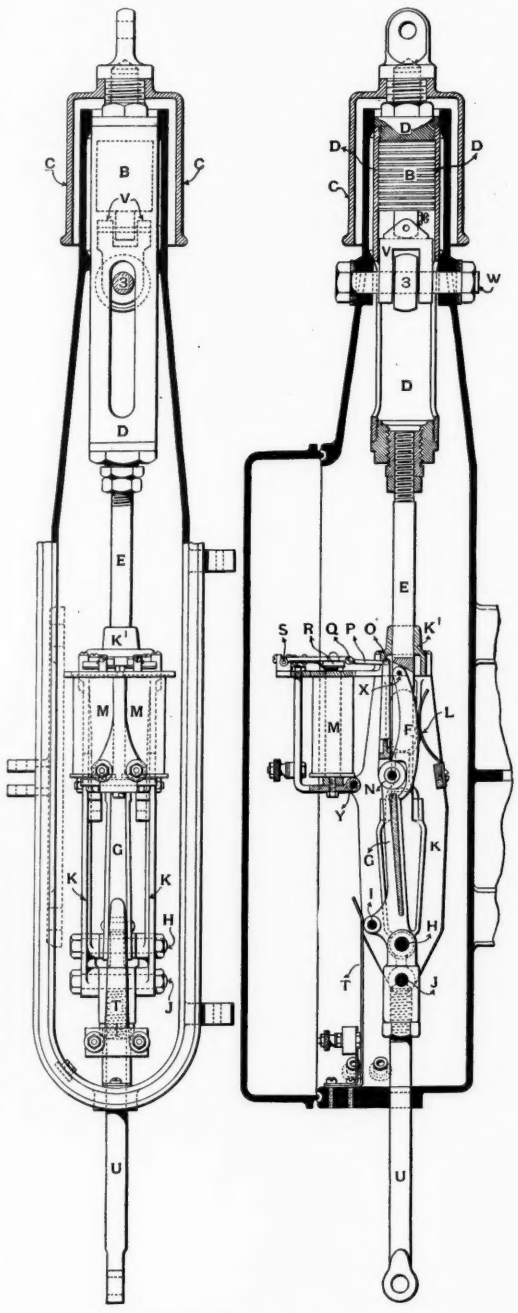


Fig. 22a.

The centers H, N and X are normally (when signal operating lever is normal) out of line, any upward pressure applied at H consequently tends to move lever G to the left, on H as a pivot. This causes roller N to move out from under pawl F (which is not movable to the left) as a result of the resistance offered by the weighted signal pressing downward at X upon pawl F. When magnet M is energized, this movement sidewise of G is resisted at O, its upper extremity, as the link P pivoted thereto is held down by the armature R. Pivots S, Q and O are normally out of line, so that when M is de-energized any effort to move G to the left causes armature R to move upward (the pivot S being fixed) and consequently permits the roller N to move from under pawl F. But if the magnet M is energized its power is ample to hold R down; and to thus prevent the movement of roller N from under pawl F. Consequently, any upward pressure on U lifts the frame K bodily, with all members of the slot engaged as shown, and the signal is thereby cleared. Spring T being secured to the case, ceases to press against lever I, the instant this movement begins, and hence its normal tendency to force roller N under pawl F is not present when the signal is at "clear."

The upper part of the "slot" is so designed as to provide an air cushion for relieving the shock that would otherwise result when the signal returns automatically to "stop." Roller 3 is a guide, traveling on the inside of the cylinder, but not at any time touching the surface covered by the piston. When a signal has been put in the all-clear position, all the movable parts, K, M, F, etc., are in the upper part of the case, and E, D, B, C, etc., are at the upper extremity of their stroke. Point I is free from spring T. Then, when a train passes, and, by its action on the rail circuit, opens M, the armature R is released and the weight of the signal acting through the several members described, forces the roller N out from under F. The rod E, with its attachments B, C, D, then drops by gravity, restoring the signal to the horizontal position. If now the signalman pulls rod U down again and attempts to clear the signal a second time (before M has been re-energized) he can push up U, J, N, M, etc., but this movement will have no effect on F and E, and the signal will remain in the stop position. When the train goes out of the block section at the next station, M is energized and the signalman's control over E and the signal is restored.

It is to be borne in mind that the Coleman apparatus is a development from earlier and less complete types. In the Sykes apparatus, as originally used, each lock instrument controlled the signal lever at its own station by



Figs. 21 and 22.—The Union Electric Slot.

mechanical means (rods) instead of by an electric lock. In Patenall's modification, used in the Fourth Avenue Tunnel, New York City, and on the main line of the New York Central & Hudson River Railroad (introduced in 1892), various additional safeguards of an ingenious na-

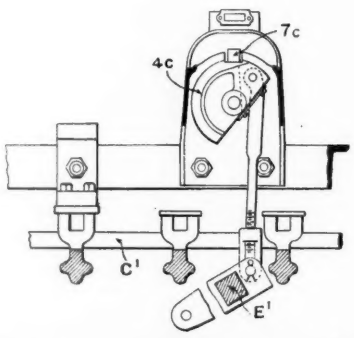


Fig. 20a.

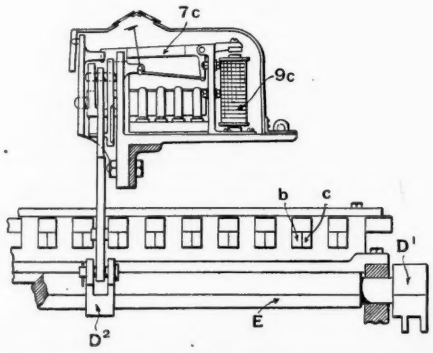


Fig. 20b.

*Previous articles in this series may be found on pages 4, 34, 83, 166, 222 and 565.

ture are provided to meet what were deemed the peculiar conditions of the traffic in the tunnel, through which about 500 trains pass daily (on four tracks).

To provide for permissive signaling in case of failure of electrical apparatus the signals in the tunnel were made three-position. A single rod connection (pushed by one lever or pulled by another) serves for all three indications.

The electrical apparatus is modified by the introduction of a slide beneath the plunger whereby the signal lever is directly unlocked. There is an electrical switch which keeps all metallic connections with the electro magnet normally broken, putting the same in circuit at the proper time. By leaving the slide pulled out the signal can be operated indefinitely (as for switching movements) without affecting the electrical connections. The lamps are fitted with zinc and copper strips, which, by the action of the heat make and break an electric circuit so as to give a visual indication in the cabin, by means of an electro magnet, showing that the light is burning. If the light goes out an audible alarm is given. At each home signal there is a torpedo machine, automatically placing a torpedo adjacent to the track when

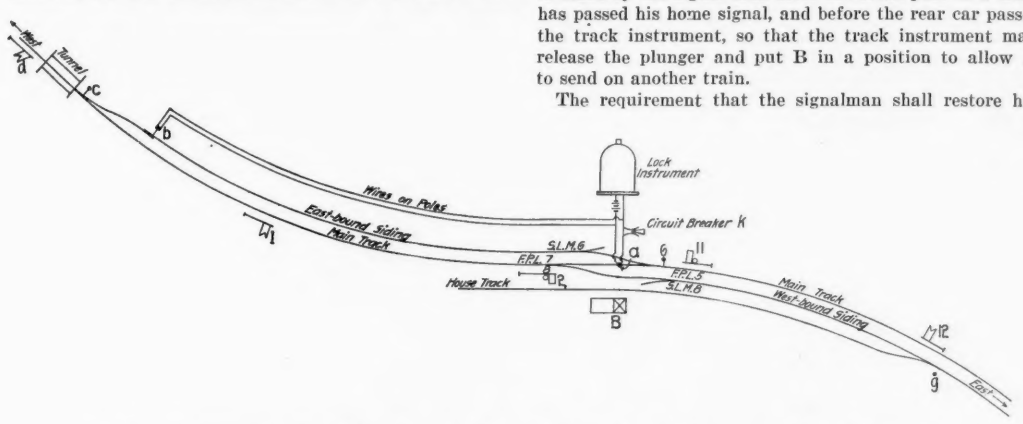


Fig. 24.—Controlled Manual Block Signals at Fort Spring, W. Va., Chesapeake & Ohio Railway.

Line Wire from Station to Station not Shown.

the signal stands at "stop," and withdrawing it when the signal is cleared.

In the tunnel the signals are disks, fixed to a vertical rod which turns on its axis. On that portion of the line outside the tunnel (about three miles) the three different indications are shown by a semaphore with two arms or blades, both turning on the same pivot. In this signal, which is shown in Fig. 23, both arms horizontal (*a*) indicate stop; both inclined downward (*b*) indicate all-clear, and the green arm horizontal while the red is inclined downward (*c*) indicates that the train may proceed, but with the understanding that the locking apparatus is out of order. The lever clearing the red blade cannot be pulled unless the block section is unoccupied, as the apparatus is controlled by a lock in a track circuit extending throughout the whole of the section. The term "permissive signaling" is therefore somewhat inaccurate. The view *a* shows the normal position. In *b* the green blade has been moved down by pushing up rod *s* attached to arm *g* and has carried the red blade down with it, there being a lug on the blade for this purpose. In *c* the red blade has been moved down by pushing up the outside rod *r*, and this rod, by its horizontal slot, has raised the green spectacle *G* to a position in front of the lamp. This green spectacle is not attached to any blade. Rod *s* working the green (rear) blade is not visible in the drawing above the point *s*. As before stated, pushing the connection *x* (to the right) clears both arms, while pulling it lowers only the red arm. As shown at *c* the reversal of the green lever (to pull *x*) pushes up the auxiliary spectacle *G*; when the red lever is reversed (to push *x*) both arms are cleared and the auxiliary spectacle remains down. The lamp (imperfectly shown in *b*) is behind the red spectacle in *a* and behind the green in *c*. There is no glass in the grip of the green blade. The reversing of the green lever does not move the rod of the green blade nor does the red lever work the rod of the red blade.

On the Chesapeake & Ohio, single track, a modified form of lock-and-block instrument is in use for blocking in both directions for the same track and it has been adopted by the railroad as standard, 150 instruments being now in use.*

In this arrangement, which was devised by the late M. B. Leonard, Superintendent of Telegraph of the Chesapeake & Ohio, the operator at B controls the lever of the starting signal at A, the same as in other controlled manual block signaling. Referring now to station B, the arrangement of the signals and apparatus is as shown in the accompanying diagram. Fig. 24. (The line wire from station to station is not shown.) The road being single track, the sidings for eastbound and for westbound tracks are located as shown, the outlets of these tracks overlapping each other in front of the station or signal cabin. An electro magnet in the locking apparatus in the cabin is actuated by trains by means of a track instrument (*a*) in front of the cabin or by a circuit closer (*b*) at the western end of the eastbound siding. (The same arrangement exists for westbound trains, a circuit closer being placed at the east end of the westbound siding.) The signalman, to permit an eastbound train to come from A, "plunges" to unlock A's signal lever; and, having done so, his plunger remains locked until it is released by the arrival of the train. While B's plunger is locked the line circuit is open, so that A cannot clear B's westbound signal. This signal is controlled only by A's battery. The train either passes through and releases the plunger by closing the circuit at *a*, or else enters the side track. If it does the latter the switch, *c*, must be closed by the brakeman of the train as soon as the last car clears the derailing switch at *b*, and this operation, which simultaneously opens the derail at *b*, momentarily closes (at *b*) a circuit which releases the plunger.

To send a train forward, B, having been unlocked by station C, clears signal 2. This is done for a train starting from the side track, the same as for one passing on the main line. Clearing this signal breaks, at *k*, the circuit connecting the track instrument *a* with the cabin, and consequently the plunger cannot be released by a train passing on the main line, until the signal is restored to the stop position. This restoration is made by the signal man after the front part of a train has passed his home signal, and before the rear car passes the track instrument, so that the track instrument may release the plunger and put B in a position to allow A to send on another train.

The requirement that the signalman shall restore his signal to the stop position as soon as a train has passed makes him vigilant in watching for the markers, and thus tends to provide an efficient check against giving a clear signal in case a part of a train has been broken off and been left in the block section.

In the case of a train entering the sidetrack, the duty of closing the switch *c* devolves on the man at the rear end of the train, so that there is no likelihood that the plunger will be released from *b* before the whole of a train has arrived.

The switches and signals which are numbered in the drawing are worked by a 12-lever interlocking machine in the cabin. The switches *c* and *g* and signal *d* are not connected with the cabin. The derailing switches marked S L M 6 and S L M 8 are worked by means of rods connecting with switches 6 and 8. The derailing switches (*b*) at the outer ends of the sidetracks are likewise connected with their respective main line switches by a switch and lock movement. Signals 2 and 11 have indicators to show for trains to enter the sidetracks.

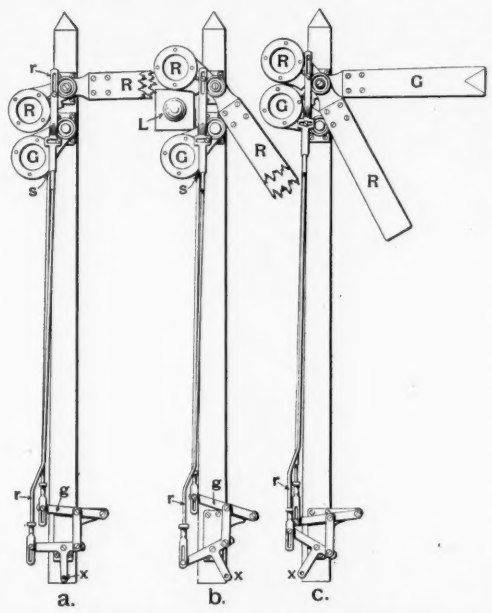


Fig. 23.—Semaphore for Permissive Block-Signaling.

On the Chesapeake & Ohio a train is never allowed to enter a block section before the preceding train has passed out of it, except by the issuance of a "caution card," which is a written order delivered to the engineman of the train; and signalmen do not issue these cards except by direction, in each case, of the train dispatcher.

*The Chesapeake & Ohio uses the electric train staff on certain short sections of single track, situated between sections of double track.

Research Work for Naval Architects.

Prof. Sadler, the new Professor of Naval Architecture at the University of Michigan, writes in the *Inlander*:

"At the present time the science of naval architecture stands in need of research work, especially in that branch which deals with the forms of ships and propellers. To carry out such experiments a large tank with suitable apparatus is required. Most of the maritime nations own such establishments, but immediate need of experiments on certain types of vessels which the nation requires occupies the whole time of the staff, and a comparatively small amount of systematic research can be performed. A university is not subjected to these conditions, and is without doubt the proper place for such work. It is to be hoped that before long the University of Michigan will have an experimental tank, and so take its place as the leader in this branch of science."

Some Questions About Progress and Uniformity in Signaling.*

Why does one road in a given amount of interlocking spend ten times as much as another on electric apparatus, such as track circuit locks on distant signals? If such apparatus is useful and desirable far too few roads are using it; if it is not a good thing it is used by too many. Is the whole question one of cost?

We have several different methods of block-signaling; is such a variety necessary? Is the controlled manual worth what it costs? Is it needed on your road where manual block signaling is now in effect? If not needed, can you prove that it is not? The men who sell signals seem to think that the railroad manager frequently does not know what he wants. Can this be because his signal engineer has not grasped the subject on all its sides or has been too modest to tell what the road needs? Probably not; for such managers usually have no signal engineer at all; but how can such a manager be made to feel the need of one?

Do you and your manager fully agree as to what your road needs? If not, which one of you holds the correct view? How much money has been saved by the use of block signals on any particular road—your own or any other? Assuming that, as some say, the direct money saving is rather hard to determine, what fact or argument should be presented to the manager who seems to think that block signals are unnecessary? The signal engineer whose manager does appreciate block signals could do a good service to some of his fellow signal-engineers by reporting that manager's views here. A clear and satisfying statement of them would help many a signal superintendent.

How many interlockings (at crossings) can you count on your road where the other road has certain standards different from yours? Which of the two standards in any given case is right? If, in any case, yours is wrong, what can be done about it?

What degree of uniformity do you find, as between your road and others, in the matter of inspection and maintenance? I heard the other day of two roads practically side by side, one of which appeared to be spending about twice as much per mile as the other on the care of automatic signals. Which of these two was right?

. . . There ought to be agreement as to whether two stop-signals, neither controlling the other, shall be used close together, as for example a train order signal near a semaphore block signal. And is it not desirable for men of different roads to confer as to a possible uniform distance for locating distant signals? I do not mean one unchangeable number of feet, but standard distances for like circumstances; or an agreed range of distances, even if, at first, it be a long range. When shall we agree as to what indicates caution? Shall it be a horizontal arm, notched? Or an arm hanging down 45 degrees? Or one inclined 45 degrees upward? Or are we right in using all these? What is the precise meaning of "caution" as applied to the fixed signals now in use?

Do you get your share of the money expended by your general manager? If not, why not talk your ideas into his mind more thoroughly? It seems to me that that is one of a signal engineer's most important duties. . . . Be up to date while at the same time always ready at a moment's notice to reject and denounce any upstart invention or scheme offered to you which is not meritorious, and to forcibly state good reasons for your views.

I recognize, of course, that enlargement and economy must go together. The desideratum is to spend the money and then show that it is well spent. You will recall a recent instance where a well-known president spent fifteen millions of new capital, all at once, for new cars and new engines; and no doubt he had to convince his directors that the new engines and cars would earn five or six per cent. on that money. Can you not make a similar argument for new signals on your road? Give your manager concrete arguments. I heard of a road on which the manager showed a saving of $30,000 a year in the accident account by adopting block signals. That is to say, for six years before the signals were put in about that sum was spent yearly on account of collisions, while for the next six years the expenditure was brought down practically to nothing. If all trains on your road are always on time you may not be able to convincingly show the need of signals; but if there is any portion of the line, even a single mile, where a

*Extracts from a paper by B. B. Adams, Associate Editor of the *Railroad Gazette*, to be read before the Railway Signaling Club, at St. Louis, Nov. 13.

shorter time interval would enable your superintendent to do more business, there is the place where the space interval ought to be put in force. Why wait until you have 50 miles that need block signals? Conservative managers look upon six or seven minutes as the shortest safe time interval; but with block signals this can at once be reduced one-half or two-thirds. If six minutes is the shortest safe time interval a reduction (by block signals) to three minutes *doubles the capacity of the road.* A three-minute interval has been maintained on some lines for many years past. . . . On the road that saved the $30,000 the business has increased 60 per cent. in six years. Imagine the results of that increase if the block signals had not been put in. If business on your busiest line increases 25 per cent. in the next year or two will your department be ready for the added responsibility?

How about block signals on single track lines? Wherever your president proposes to build a second (or third) main track there is an opportunity to try to show him that he can postpone for several years a $500,000 expenditure for track by spending a fifth or a tenth of that sum for signals. Not in every case can you prove your point, but of course it is your duty to try.

Tests of the Cardwell Brake-Shoe.

Prof. Goss has just completed, at Purdue University, a series of experiments with the Cardwell brake-shoe, which is being put on the market by the Drexel Railway Supply Co., Chicago. What is here given is the result of the last tests, but these were preceded by many experiments for the purpose of determining the effect of changes in the proportions of hard and soft iron in this shoe, and also the friction of Cardwell shoes made of different kinds of iron. The object of these preliminary tests was to get, by varying the proportions of known materials, a mean co-efficient of friction equal to or a little greater than that of the ordinary cast-iron shoe, and still retain an insert of hard iron sufficient to give the desired wearing qualities. Finally a satisfactory combination of this kind was made, as the result of the information got from the preliminary tests, and this was then tested fully on the brake-shoe maching under the conditions of the M. C. B. tests of 1895 and 1896.

The form of the shoe is shown by the engraving and the insert of hard iron is about 31 per cent. of the entire bearing surface; the body of the shoe is of soft iron. That this shoe has the frictional qualities desired is shown by the table and also from the following extracts from Prof. Goss' report:

"It is customary in estimating the value of shoes under test to compare the results obtained from them with those

The Cardwell Brake Shoe.

obtained from iron shoes used in the M. C. B. tests. These shoes are chosen as a standard not because they are especially desirable for service, but because the results from them are more uniform than those derived from other shoes and because of the ease and certainty with which such tests may be duplicated. The soft cast-iron shoe which constitutes the standard, is much softer than the ordinary, so-called soft cast-iron shoe used in railroad service, and, hence, gives a high co-efficient of friction. The hard cast-iron shoe used in the M. C. B. tests was made from a mixture which would ordinarily be termed soft cast-iron, although it was in the M. C. B. tests referred to as the hard cast-iron shoe.

"A comparison of the performance of the shoe under test with the standard soft cast-iron shoe, and, also, with the hard cast-iron shoe, all under similar conditions, may be made from the tabulated statement. Such a comparison shows that the shoe tested gives, on a steel-tired wheel, a co-efficient of friction which averages 82 per cent. of that shown by the soft cast-iron shoe, the limits of variation being from 66 per cent. to 101 per cent.; and 110 per cent. of that shown by the hard cast-iron shoe, the limits of variation being from 82 per cent. to 144 per cent. On the chilled wheel, the shoe gives a co-efficient of friction averaging 92 per cent. of that shown by the soft cast-iron shoe, the limits of variation being from 80 per cent. to 108 per cent.; and 135 per cent. of that shown by the hard cast-iron shoe, the limits of variation being from 108 per cent. to 159 per cent.

"The shoe takes hold well at the beginning of an application and in general it maintains its hold throughout the stop. The final rise in the value of the co-efficient at the end of the stop is not excessive."

Average Results of Cardwell Brake-Shoe Tests Made at Purdue University.

Average Speed, M. P. H.	Pressure on Shoe. Pounds.	Average Length of Stop. Feet.	Average Mean Coef. Cardwell Shoe. Per Cent. of Friction.	Average Mean Coef. of Friction. Soft Cast Iron Shoe. Per Cent.	Coef. of Friction. Per Cent. of that for Soft Cast Iron Shoe.	Average Mean Coef. of Friction. Hard Cast Iron Shoe.	Coef. of Friction. Per Cent. of that for Hard Cast Iron Shoe.
			Steel Tired Wheel.				
30	2,808	578	24.7	37.6	65.8	30.2	81.9
40	2,808	834	29.4	36.9	79.8	20.5	143.6
65	2,808	2,888	18.8	27.2	69.2	16.5	114.1
40	4,152	614	26.1	31.5	83.	25.4	102.9
30	6,840	229	24.5	24.3	100.8	20.4	120.1
40	6,840	412	23.5	24.3	96.5	20.3	115.5
65	6,840	1,991	11.6	14.5	79.7	12.5	92.5
			Chilled Wheel.				
30	2,808	520	27.4	34.2	80.2	25.3	108.4
40	2,808	789	30.7	31.7	96.9	21.3	144.2
65	2,808	2,588	22.5	20.8	108.1	14.1	159.4
40	4,152	582	27.7	28.2	98.3	20.1	137.8
30	6,840	214	25.7	26.4	97.4	22.0	116.9
40	6,840	392	23.8	26.2	90.9	16.6	143.4
65	6,840	1,573	14.6	21.0	99.8	..	..

The Taxation of Corporations.

The workings of the New York corporation tax laws are described by Col. Timothy S. Williams, Vice-President of the Brooklyn Rapid Transit Company, in a recent address to the Municipal Club, of Brooklyn. A portion of his address is here reprinted. The constitutionality of the Franchise tax law of 1899, which became effective this year, and which has been interpreted to apply to steam railroads as well as to street car lines, is a question now before the courts. For a discussion of the basis of that law the reader is referred to the *Railroad Gazette*, March 17, 1899, page 190.

Taxes upon corporations are of so many kinds that few persons have any appreciable idea of their aggregate amount. The Brooklyn Rapid Transit Company paid last year in direct taxes to city and State $737,000, and in indirect taxes to the city as part of the burdens imposed upon its franchises an additional sum of $305,000, a total amount of $1,042,000. This was nearly 10 per cent. of its gross earnings, and it was nearly three times the amount of the year's profits. For every dollar placed to the credit of the company's stockholders, $3 went to the credit of the city and State. Nearly $2,900 a day had to be set aside for the expense of government! The average profit per cash passenger after paying operating expenses and interest on cost was sixtenths of 1 cent, and it, therefore, required the carrying of 483,000 cash passengers every day in the year in order to yield profit enough to pay the company's taxes. . . . . .

The latest efforts at reorganization just before acquisition by the Brooklyn Rapid Transit Company reduced the bonded indebtedness over $5,000,000 and the annual fixed charges over $600,000, and the $25,000,000 of added Brooklyn Rapid Transit stock took the place of nearly $40,000,000 of stock of the absorbed companies. The consolidation of properties was a business risk, inspired by the hope that with reduced fixed charges and with the economies which were expected from joint operation, the combined properties could yield profits instead of losses, and by multiplication of facilities still further expand the growth of the city. The very first result of these reduced charges and economies has been that railroads which for years had failed to pay their taxes are now contributing largely toward the expenses of State and city government. The first, and as yet the only, beneficiary of our economies, therefore, has been the city treasury. . . . . .

So far as real and personal property are concerned, we are in the same category and on the same level with all other taxpayers, with this exception—that the tax assessor can always find and locate our personal property—cars and motors and trucks and tools and supplies—but he very seldom finds and assesses the personal property of individuals. We pay each year on our power houses, our car barns, our lands, our tracks, our elevated structures and all our other kinds of real property over $330,000 a year. Thus far we are on an equal plane with other property owners. Beyond that our payments are special burdens—imposed because we are corporations and because we occupy public streets. These special burdens began in 1853, when we were charged with certain paving obligations, and a license fee for every car operated, and although that car license fee was declared to be "in full satisfaction for the use of streets," and although we believe this declaration, confirmed as it afterward was by legislative act, constitutes a contract which, if insisted upon, would relieve us from many later purely franchise taxes, we have borne without active complaint each additional burden until the latest crowning imposition contained in the so-called franchise tax of 1899 has forced us to cry out in protest and to appeal on grounds of law and equity to the courts and to the people.

Without considering the effect of the new franchise tax at all, we are paying directly and indirectly over $700,000 a year in what are purely franchise taxes. There are two kinds of franchise taxes—one the tax which a company pays for the privilege of being a corporation, and the other the tax which it pays for its occupation of public streets and places; but the Legislature had confused the two long prior to the adoption of the new franchise tax law. Otherwise it would have treated all corporations alike. Charters are largely free; no special legislative acts are longer required; any set of men can get together and upon complying with certain formalities and paying the incorporation fee become a corporation. But the Legislature has said that certain kinds of corporations enjoying public franchises, like gas and electric and street railroad companies, shall pay a much larger tax for the privilege of doing business under a corporate name than other kinds of corporations, and there is absolutely no justification for this discrimination except upon the theory that the tax is based upon the occupation of public streets and places. For this privilege, therefore, our companies paid to the State last year over $200,000. We paid to the city for the privilege of carrying the people across the Brooklyn Bridge without extra fare, $170,000. We paid in car licenses and percentages to the city over $30,000. And we paid in paving and repairing city streets, in removing snow and ice, in lighting certain streets and public places, and in free transportation of policemen and firemen, over $300,000. All these are franchise taxes, and to impose fresh ones, more than half as large as all the others combined, is a tyrannical exercise of the taxing power, which, if applied to individuals generally, would cause a popular revolution, but if applied and enforced against corporations will mean for some of them bankruptcy, and for others restriction of improvements, curtailment of facilities, possible reduction in wages, and much lessened profits. . . . . .

The transportation conditions of European cities have only to be compared with those of American cities to illustrate in a general way the results of municipal enterprise on the one side and those of private enterprise on the other. Neither in mileage of track to population, in motive power, in equipment, nor in rates of fare for equal distances, do the transportation of European cities anywhere nearly approach those of the foremost American cities. In much-heralded Glasgow, with a population of 800,000, there are only 73 miles of tracks, and the fare is six cents for a distance not greater than six miles. In Berlin, with a population of nearly 2,000,000, there are only 260 miles of track, and the maximum fare is 7½ cents. In Paris, with a population of 2,500,000, there are only 206 miles of track and the maximum fare is eight cents. In London, with a population of 4,500,000, there are only 245 miles of track. And in all these cities the operation of the minimum rate of fare with increased rates for longer distances has congested the population, prevented the territorial growth of the cities, and imposed a higher average rate for the distance than is charged in America, although the wages paid to employees here are considerably higher and the cost of operation thereby greatly enhanced. In Brooklyn, on the other hand, with 1,200,000 people, there are over 500 miles of track, and the longest distance for five cents is nearly four times the distance which one can be carried for the same money in any European city.

A Massachusetts Crossing Case.

The Railroad Commissioners of Massachusetts, in a complaint of the town of North Easton concerning a new railroad bridge which was not satisfactory to the town officers, have decided in favor of the town. The decision, in substance, is as follows:

"This is an appeal by the New York, New Haven & Hartford Railroad from the decree of the County Commissioners of Bristol County ordering it to widen a bridge in North Easton. Main street, the principal thoroughfare in North Easton, has for many years crossed the railroad by an overhead bridge. About a year ago the railroad company had under advisement plans for repairing and strengthening this bridge. In connection with this improvement the town took action looking to the widening of the highway in its approach to the bridge about 2 or 3 ft. on the south side. The bridge was about 39 ft. wide and about 2 ft. narrower than the highway as then in use. The fact that the town proposed to widen the highway was brought to the attention of the engineering department of the railroad company by a representative of the town, who was informed that the company had no intention of rebuilding the bridge. The company subsequently decided, however, to rebuild the bridge and without notice to the town let the contract therefor. In the prosecution of this work the stone abutments were so built as to permit the widening of the superstructure of the bridge upon the south side in conformity with the proposed new line of the street. But when the materials for the superstructure were placed upon the ground and the work of erecting it begun it became evident that the new bridge was to be of the same width as the old one. The selectmen thereupon protested against this and requested that the bridge be extended on the south side the 4 or 5 ft. necessary to bring it in line with the highway as widened. They were told that it was too late to make any change in the plan of the bridge as the contract had been given out and the contractor was on the spot ready to do the work. The desired change would have called for two additional floor beams and a little additional planking, at a total expense not exceeding $200. The bridge was completed, notwithstanding the protest, in accordance with the original plan of the company, and of the same width as the old bridge. The town petitioned the County Commissioners and that board directed that the bridge be widened. The company appealed to this board, claiming

"'1. The security and convenience of the public do not require any alteration to be made in the bridge.

"'2. The railroad company has recently constructed and practically completed a new and expensive bridge at the point in question and if any alteration were desired by the selectmen it should have been asked for when the recent alterations were begun instead of after they were practically completed.'

"As to the need of this alteration in the bridge, we are satisfied that the public convenience and security do require the widening for the purpose of affording the necessary opportunity for a suitable sidewalk to be separated from the roadway over the bridge and to be in continuation of the sidewalk upon that side of the street. Proper protection of the foot passengers, who use this bridge in large numbers, from injury through the fright of horses occasioned by the noise and smoke of passing trains, calls for a sidewalk of this character, as well as the decided

public advantage in having the bridge constructed in line with the highway at this place.

"The railroad company contends that an earlier request for this change should have been made, but it is clear that the town officers had reason to expect under the circumstances that the company would not arbitrarily proceed to rebuild the bridge of the same width as the old one without previous notice to them of its intentions. Moreover, they had reason to believe from the manner in which the abutments were built that the bridge was to be of the desired width. But if there was any lack of diligence in this respect on the part of the town it appears that the request was actually made when the cost of granting it would not have exceeded $200. It is true that the contract had been given out and some delay would have been caused in making the change. There was nothing, however, so sacred about this contract as to make it improper to change it for the public good and the delay would have been inconsiderable.

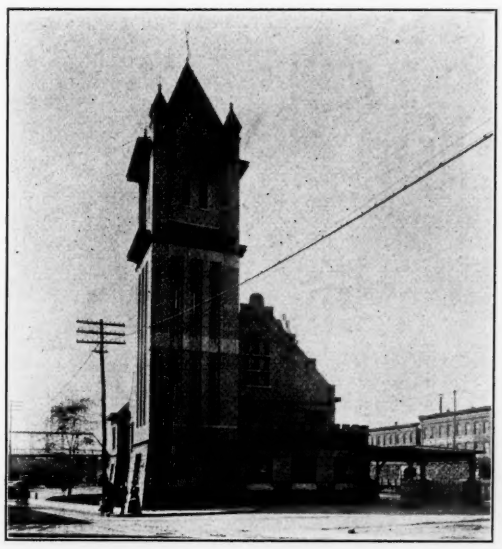
"The action of the railroad company cannot be justified. As a public service corporation it was bound to treat reasonable demands made upon it in behalf of the public interests with full courtesy and consideration. The improvement in this bridge was one in which the town and the company had a joint interest, but the company apparently refused to attach any importance to the wishes of the townspeople in the matter and adopted an arbitrary course that showed scant recognition of its obligations to the public. Nor is there any excuse for this conduct from the standpoint of a sound economy or shrewd business management. Had there been some principle at stake which the company could not afford to violate, then the fact that the expenditure involved was small would be unimportant. But there was no such principle at stake. It was simply a question of a trifling outlay at a slight inconvenience for the accommodation of one of the communities with which it is constantly dealing and from which it is deriving a portion of its revenue. If there is any ground upon which it can be reasonably argued that it is profitable for the company to secure the ill-will of this community under the circumstances existing in this case we have overlooked it.

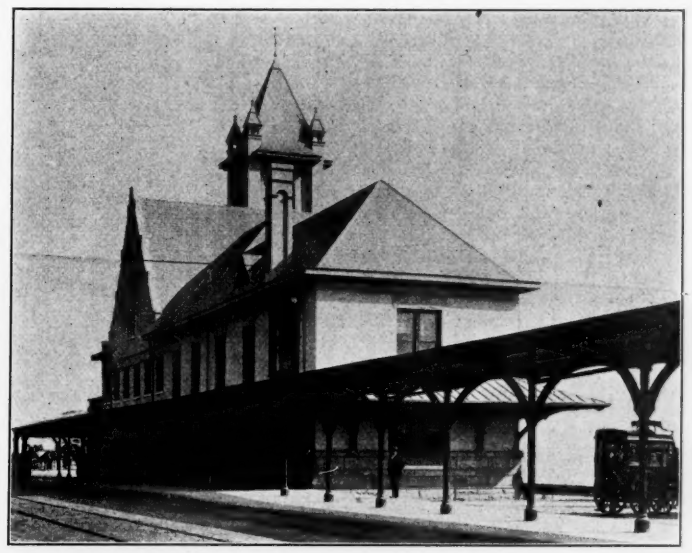
"If the administration of affairs was too far removed from the scene of action for a proper appreciation of the circumstances it shows that there is need of a change in methods to enable the corporation to deal efficiently with matters of this kind which ought not to be treated as of too little moment to warrant careful attention.

"In view of all the facts, in the opinion of the Board, it is necessary that an alteration be made in the bridge . . . and accordingly it is ordered that the superstructure of this bridge be widened about 5 ft. on the south side thereof, as particularly shown upon the plan therefor now on file in the office of the Board, marked 'D 337.'"

Passenger Station of the Southern Railway at Richmond.

The Southern Railway has lately finished a new passenger station at Richmond, Va., the appearance of which is shown in the accompanying engravings, made from photographs. The building is situated between Fourteenth and Virginia streets, below Carey street. The extreme length of the building is 157 ft. 9 in. and the arrangement of the rooms on the first floor is shown in the drawing. The passageway marked E has arched openings, both front and rear. The opening from this passageway to the baggage room is fitted with a shelf or counter over which light baggage can be handled. This opening has a door which slides up. The four doorways to the baggage and express rooms are each fitted with sliding doors, hung overhead.





Figs. 1 and 2.—New Passenger Station of the Southern Railway at Richmond, Virginia.

That portion of the second story of the building above rooms C, D, E, F, G, is occupied by the offices of the Superintendent, Roadmaster, Supervisor and Train Dispatcher; and there is also a conductors' room and a supply room.

The walls of the building up to the first story window sills, and in some parts up to the level of the second floor, are made of Virginia granite; above the stone the building is faced with Powhatan gray pressed brick, made at Clayville, Va. The covering of the roof is Eureka green slate. The interior finish is of chestnut and bright yellow pine. Most of the floors are of yellow pine, but in the main waiting room marble is used, and in the vestibule beneath the tower there is a mosaic floor. The building is heated with steam, by low pressure apparatus, and the chandeliers and lamps are fitted for both gas and electric lights.

The architect of this building was Mr. Frank P. Milburn, of Charlotte, N. C., and it was built by Mr. W. A. Chesterman, of Richmond.

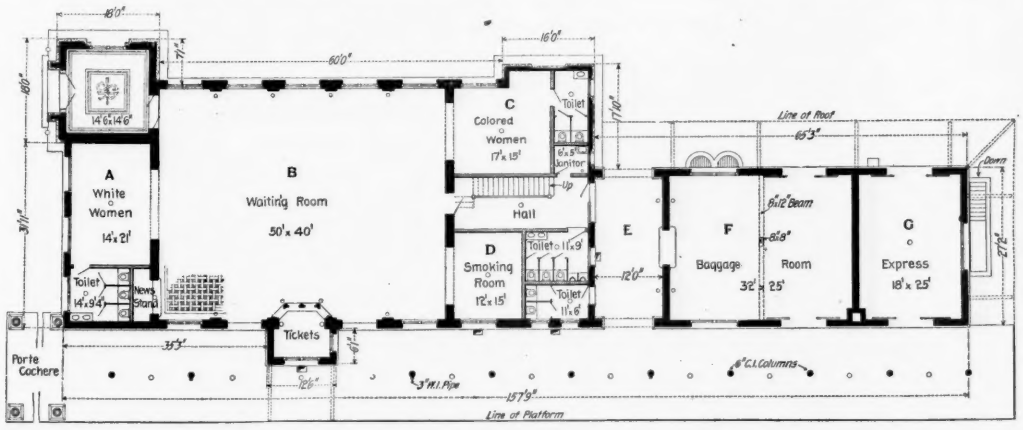


Fig. 3.—Southern Railway Company's Passenger Station at Richmond.

As will be seen by the photograph, the covering over the platform is supported by a framework of umbrella design, carried on a single line of posts. An end elevation of this roof is shown in Fig. 4. The framework is of wood supported on cylindrical cast-iron posts. The horizontal timbers and the umbrella arms rest on cast-iron lugs as shown. The columns under the roof beyond the station are set 14 ft. apart. For that portion in front of the building every other column has fittings for the water pipe. Under the other portions of the roof every column has these fittings, and they are arranged to receive water from each side alternately. The roof extends 190 ft. beyond the end of the building.

The *Railway News* (London) prints a list of railroad directors who are members of the new Parliament. The list contains the names of 55 men who are directors of British railroads, and 11 who are connected with foreign or Colonial companies. All of the prominent English companies are represented in the list.

Notes on Steam Shovels.

It is always interesting to note the advance made in methods or appliances for doing work, and information obtained from the Vulcan Iron Works Company, of Toledo, Ohio, regarding steam shovels will doubtless be of general interest. This company was among the first to build steam shovels, and for the past twenty years has made a specialty of that work. Twenty years ago steam shovels were used only by some of the largest railroads and contractors, and these were built in a crude manner and of a light pattern. Wood was largely used in their construction, they were subject to continual breakages, and the delays and repairs made the use of steam shovels expensive. The improvements made have been brought about as the result of a close study of the conditions under which these machines work, and better designing based on experience has largely eliminated the failure of details. Now steel has replaced wood in the construction of steam shovels, and they have been greatly increased in both size and capacity.

What is thought to be the first steam shovel in this country was built to run on a wide-gage track, and it had a low frame and was not a success. Among the first shovels mounted on standard gage trucks was one sold to the Terre Haute & Indianapolis R. R. by the Vulcan Iron Works Company about twenty years ago. This is still in service, although during that time it has received a good many repairs and recently it was completely overhauled, being placed on a new steel car and many modern improvements were added.

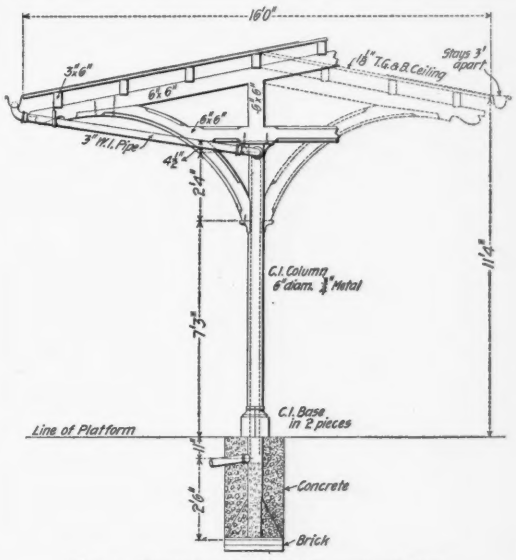


Fig. 4.—Platform Roof, Richmond Station.

The shovels built twenty years ago answered the following description and cost about $7,000. All the machinery was placed on an ordinary flat car, the crane was of wood and built low to pass under bridges. The jack arms were wooden timbers fastened under and extending across the front end of the car to prevent upsetting. The hoisting and swinging machinery consisted of one pair of 8 x 12-in. engines, fitted with links for reversing. The engines were geared to two drums, one for hoisting and the other for swinging. The car was propelled by an endless chain leading from the drum shaft to chain wheels on the front axle. An upright boiler, 48 in. in diam. and 7 ft. high, was placed at the rear end of the car and to one side of the center, the double engines being set opposite the boiler. The water tank was of iron, was hung

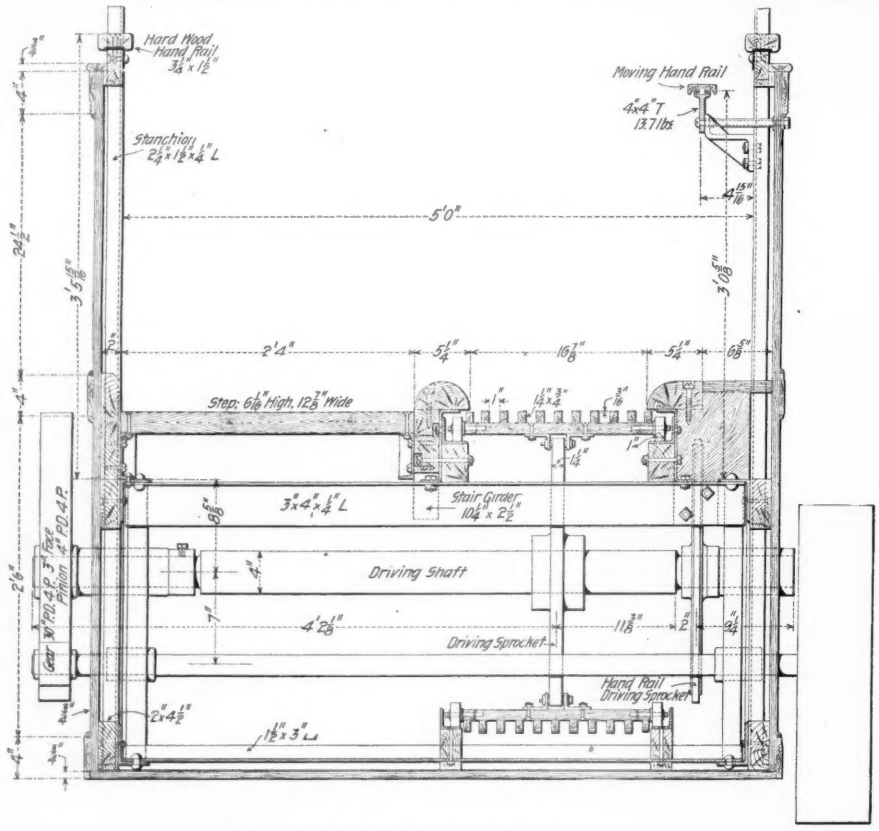
under the car and the house over the machinery was made entirely of wood. The dipper was of 1½ cu. yds. capacity and fitted with a wooden handle. The machine complete, including the car, weighed about 38 tons, and had a capacity for handling 750 cu. yds. of ordinary material a day.

The latest design of Vulcan steam shovel is mounted on a car 35 ft. long and 10 ft. wide, built entirely of steel with 15-in. sills. Special Fox pressed steel trucks are used. It has a 2½ cu. yd. dipper with a handle 16 ft. long fitted with steel racking. The crane is 23 ft. high from the track and extends 21 ft. out from the mast, and the clear lift with the dipper door open is 14 ft. Material can be dumped 25 ft. either way from the mast. A locomotive type boiler is used, 66 in. in diam. and 14 ft. 6 in. long, carrying 135 lbs. steam pressure. The engine equipment consists of one 125 h.p. double hoisting engine with 8 x 10-in. cylinders, a 40-h.p. swinging engine and a 35-h.p. crane engine. The jack arms are steel with 16-ft. spread and 5½-in. steel screws. The water tank is beneath the car and has a capacity of 1,200 gallons. The shovel described weighs about 90 tons and can handle 3,500 cu. yds. of almost any material in 10 hours. One of these shovels handled 5,000 gross tons of iron ore from the solid bank in that time, and 3,000 cu. yds. of blasted rock has been moved in a day. These very heavy steam shovels have only come into use during very recent years, and the first was built for the iron mines of the Massabe Range. In the month of June, 1897, one of these shovels handled 170,000 gross tons of ore from the bank; since then there has been an increasing demand for steam shovels of large capacity.

Recently there has been put on the market by the Vulcan Iron Works Company a steam shovel for digging large sewers, and these are guaranteed to dig a ditch 22 ft. deep and 12 ft. wide, dumping the material 35 ft. each way from the center of the shovel. One of these machines is now being used successfully on heavy sewer work in Chicago.

The Reno Inclined Elevator and Stairway.

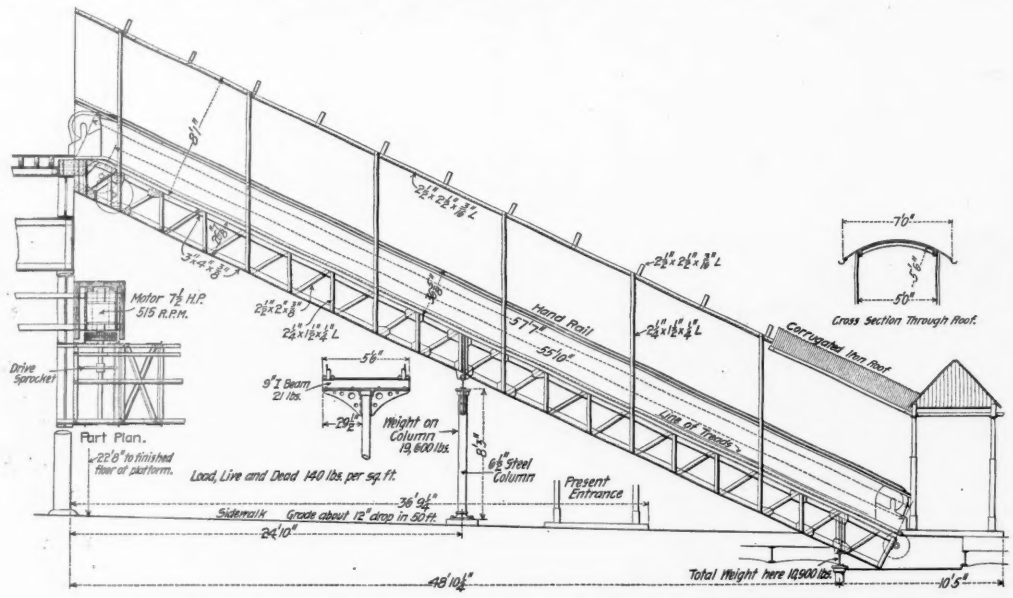
The Manhattan Elevated Railway Co. has recently erected a Reno moving stairway at the down-town station, corner of Fifty-ninth street and Third avenue, New York. The mechanism consists essentially of a moving inclined plane on which the passenger steps and is conveyed to the top where he steps off upon the stationary platform



The Reno Inclined Elevator and Stairway.

of the upper level. The apparatus has been successfully applied in a number of department stores where large crowds are to be carried.

The device, as erected at the Fifty-ninth street station, is shown by the accompanying engravings. The moving plane has a clear width of 17 in. and beside it there is a flight of steps 2 ft. 6 in. wide that are to be used in descending. The motive power is an electric motor. It is beneath the platform at the top and drives the plane from its upper end, so that the portion in use is the tight side of the belt. The moving portion closely resembles the hinged link belt that has been used for driving dynamos. The weight is carried on rollers that rest upon a runway on either side of the plane. It may be noticed that the inclination of the plane is somewhat less than that of an ordinary stairway, the slope being 42¼ deg. This increases the area of sidewalk covered but makes the stairway of low risers and the moving surface easy to stand on. A moving hand rail, running at the speed of the platform serves to steady the passenger when first stepping on. The surface speed of the elevator is 90 ft. a minute, so that, in the case of the station under consideration, it requires about 30 seconds to rise from the street to the upper platform. This is a longer interval than would be required to walk up the regular stairway by the ordinary individual. It could be walked in a leisurely manner in about 22 seconds. But if one chooses to walk forward



The Reno Inclined Elevator and Stairway as Installed on the Manhattan Elevated.

while on the incline the time can readily be cut down to 14 seconds. It is claimed that the device can handle 3,000 passengers an hour, or 50 a minute, which would cover the incline at intervals of 2 ft. That it can deliver passengers more rapidly than an ordinary elevator there is probably no doubt though the actual time of transit for the individual passenger is longer. One of these inclined elevators was tested, for 30 days, at the New York end of the Brooklyn Bridge in the latter part of December, 1896, and in January, 1897. In September, 1896, it was tested at the old Iron Pier, Coney Island, and it is estimated that more than 75,000 people were carried during that trial without a mishap. In the *Railroad Gazette* of Jan. 8, 1897, page 24, may be found reference to these tests and illustrations of details of the machinery.

Locomotive Design.

Mr. Waldo H. Marshall, Superintendent of Motive Power and Machinery of the Lake Shore & Michigan Southern Railway, gave the second in the series of lectures in the railroad course at Purdue University on Thursday, Nov. 1. His subject was "Locomotive Design."

Mr. Marshall discussed first the conditions which control the selection of a type of locomotive which is to render a given service. He urged the importance of making the machinery light so that all available weight may be put into the boiler. The possibility of improving present designs by the adoption of steel for wrought and cast-iron was carefully reviewed, and examples were given of recent achievements in this direction. In a similar manner other problems of design which are general in their application but which readily resolve themselves into matters of detail were forcefully discussed.

In conclusion, the conditions to be met in working up a design were defined as (1) safety; (2) efficiency and reliability in service; (3) economy; and (4) beauty of the whole design. Upon the last point he said: "The modern locomotive, with its mammoth proportions and simple outlines, its great boiler indicative of power, and its well-proportioned machinery is altogether too magnificent and majestic a piece of work to leave the hands of the designer in a crude and unfinished state. A handsome locomotive hauling at high speed and apparently with so much ease a long passenger train, or dragging with slower motions many hundreds of tons of freight, is a sight which pays the designer for all of his labor, and if we reflect upon the great work which the locomotive is doing, and will yet do for mankind in the development of the resources of nations, and the extension of the bounds of civilization, we find inspiration for careful, conscientious work, in the assurance that whatever can be contributed to the perfection of the locomotive is worth the best efforts of the mechanical engineer."

Brown Hoisting and Conveying Machines—Philadelphia & Reading.

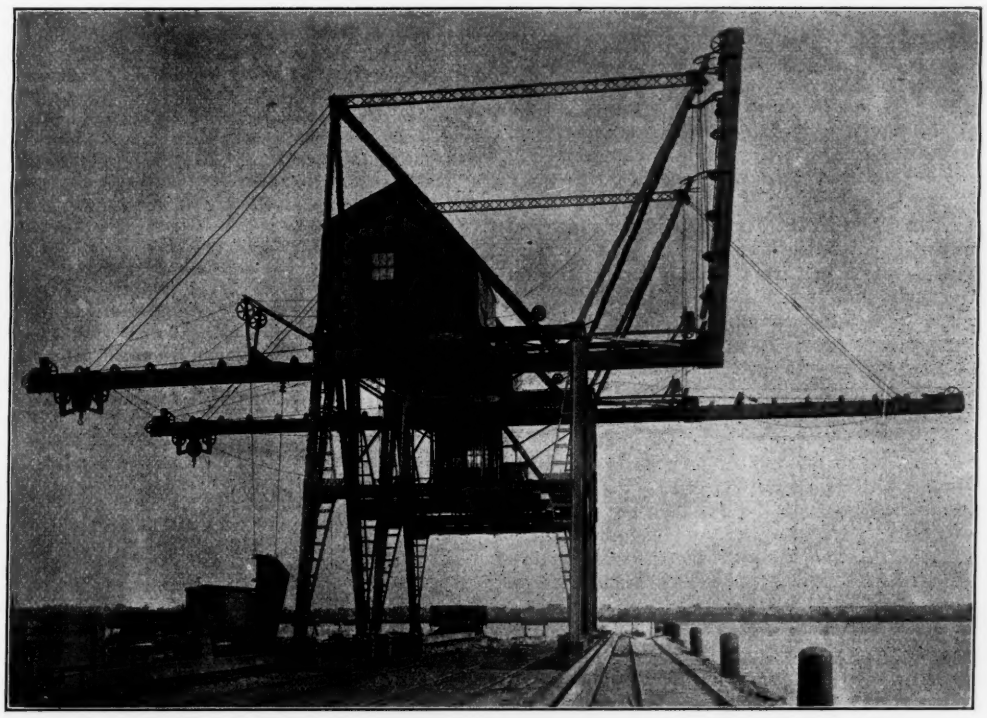
Among the recent improvements of the Reading Terminal at Port Richmond, Philadelphia, are two three-ton electric hoisting and conveying machines built by the Brown Hoisting & Conveying Machine Co., of Cleveland. One of these is here illustrated. They are on the south side of pier G and are doing good work, this type of conveyor being especially suited for use on docks where cargo is to be quickly shifted from boat to car or the reverse. It has met with much favor on railroads having water-front work to do. The Pennsylvania Railroad has 26 of this type in use and the Buffalo, Rochester & Pittsburgh has two. Recently two machines were sent to the Malmo Harbor Commission, Malmo, Sweden, and two to the Oxelosund-Flen-Westmanlands Railroad of Sweden.

The general idea embodied in these machines is that of Brown's cantilever hoisting and conveying apparatus using structural steel, chiefly channel bar and angle iron, making a light and strong structure which is built, as shown in the illustration, to rest on rails 27 ft. apart. The base thus straddles and clears two standard gage tracks and the head room from rail to the under side of the track stringers on the machine is 32 ft. There is a folding beam extending, on the water side, over one track and over the water, about 42 ft. 6 in. from the rail nearest the water. There is a fixed cantilever on the opposite side extending over three tracks, making the total length of these extensions 115 ft. 9 in. with a total motion of the trolley of about 100 ft. The hinged arm can be readily lifted by the motor to clear vessels at the dock, and is lowered and controlled by a strap brake in the manner common to bridge tramways and ore hoists. The location of the motor house on the upper deck of the machine and that of the operator's house lower down are apparent from the illustration. The wheels upon which the structure rests are double-flanged, and by shafting and miter gears the machine is made self-propelling from the motor. While shifting a cargo the machine is clamped to the track with a set of Brown's rail clamps.

The hoisting machinery includes one two-rope hoisting and conveying machine with complete equipment; one band-friction drum hoisting machine with drum 40 in. in diam. and two special band-friction pulling drums 48 in. in diam., the drums in each case having face wide enough to receive cables without over winding. A steel chute or apron swung to position from the controlling box is furnished for loading box cars. The motor house contains an Elwell-Parker electric motor, wound for a continuous current of 500 volts, with a guaranteed capacity to hoist 6,000 lbs., with an allowable overload of 25 per cent., at

the rate of between 200 and 400 ft. a minute; also to propel the trolley with this load along the tramway at the rate of from 600 to 800 ft. a minute, and, in self-propulsion of the entire structure on the track, to attain a speed of from 50 to 75 ft. a minute. The necessary controller, rheostat, gearing and clutches are furnished to make all desired motions of the machine parts without reversing the motor.

Electric current is carried to pier G from a new lighting and power station recently installed in the Port Richmond yard. Two 0000 cables, rubber-covered and placed underground, feed a naked 00 trolley wire which is placed about 19 in. from the ground and boxed in along the line of the machine's location, as shown in the engraving. The cables are so arranged as to feed into the trolley wire at both ends. The laying of this cable is of interest in that it is below the water line of high tide and therefore at each rising of the tide is submerged by seepage. It was therefore thoroughly water-proofed, and in preparing the ground and boxing for it it was necessary to provide a gravelly sub-soil that would readily drain. Pier G is built on submerged grill and piles and is earth and stone filled above the line of grillage which is below low-tide line.



Three-Ton Brown Hoisting and Conveying Machine—Port Richmond Terminal, Philadelphia & Reading Railroad.

International Association for Testing Materials.

We continue from page 717, Nov. 2, our report of the recent New York meeting of the American Section of the International Association for Testing Materials.

Steel Axles.

At the session of Friday evening, Oct. 26, the discussion upon the specifications for axles was opened by the reading of a letter of Mr. H. V. Wille, Engineer of Tests of the Baldwin Locomotive Co., in which he said: "I have voted in the affirmative on all specifications on broad grounds, though there are requirements in some of the specifications which are not representative of American practice, when judged by comparison with the tabulated statements of various specifications compiled by the committee. I also attach herewith a specification for locomotive driving axles, crank pins, rods and guides, and would respectfuliy ask you to submit same to the full committee for vote. At one of the former meetings of the committee this proposition was voted down, the argument being that provision was made for the same grade of steel in the general specifications for forgings. This, however, is not quite the case, because the general specification rightly covers steel made by any process, open-hearth, crucible and Bessemer, and also provides for the various kinds of special steels. Reference to the tabular statement for forgings issued by the various railroad companies shows an open-hearth carbon steel of about 80,000 pounds tensile is desired by practically all of them. I believe the committee would be warranted in adopting a special specification of this kind for the following reasons:

"1. Reference to Bulletin No. 18 shows that the International Chairman desires materials for locomotives considered under a separate grouping.

"Other countries will follow this course, and it would be advisable for the American Section to have specifications that will permit of ready comparison with those suggested by other sections of the Association.

"2. The large amount of this special class of forgings used annually.

"3. Reference to the compilation of forging specifications, Bulletins Nos. 3 and 15, shows that it is the users of this class of forgings who, more than any others, purchase their material to specifications.

"4. It will avoid confusion. The way the matter now stands the committee on forgings have compiled two sets of specifications, one for locomotive forgings and one for general forgings. The former is attached to the specifications for axles; the latter to those for general forgings. Obviously, if the general specifications for forgings are to cover those for locomotives, the compilation for the latter should have been attached to the general specifications. In its present status it would appear that it is the committee's intention to have locomotive forgings covered by the axle specification. This you know is not the case. The adoption of this new specification would render it advisable to omit reference to driving axles in the specification for axles, because there is nothing in common in the test requirements of driving and truck axles."

The main differences between the specifications as proposed and the recommendations of Mr. Wille may be summed up as follows: He would include under one specification all forgings for locomotive driving axles, crank pins, rods and guides. This would involve leaving these locomotive forgings out of the general specifications for axles and forgings, as proposed by the committee. For locomotive forgings Mr. Wille recommended:

Phosphorus not to exceed .05 per cent.
Tensile strength, not less than 75,000 pounds per square inch.
Yield point, not less than 37,000 pounds per square inch.
Elongation not less than 18 per cent. in 2 inches.
Contraction of area not less than 30 per cent.

Against these figures the committee had specified varying chemical and physical requirements for axles of "carbon steel" and "nickle steel," and for forgings from "soft steel," "carbon steel," annealed, unannealed and oil tempered; and "nickle steel," annealed and unannealed. Also varying physical properties for different sections. The specifications thus prepared provided for forgings having a tensile strength as low as 58,000 lbs., and for others to have not less than 90,000 lbs. tensile strength. It seemed necessary to have a separate specification for locomotive forgings inasmuch as the committee had, at great pains, prepared such full and complete specifications from which forgings of any class could be specified.

Mr. Kreuzpointner (P. R. R.) was strongly opposed to the adoption of the test specimen having a length between shoulders of 2 in. and a diameter of ½ in. He presented an extended argument in favor of an 8-in. test specimen with a diameter of 1 in. He also exhibited several etched sections of defective axles, showing how much better knowledge of the material could be gotten from the larger test piece. He considered it retrogression for the committee to recommend a 2 in. x ½ in. diameter test piece for such important parts as axles. The objections to the longer test piece were pointed out by several members, these objections being that they require a long prolongation, at least 18 in. on the end of the forging, and even then the prolongation is not likely to receive the same amount of work as the rest of the forging, so that the results obtained would not be reliable always. It was pointed out that it was possible to take the shorter test pieces from different parts of the forging, as for instance at both ends, and in the case of crank shafts at the crank. Prof. Merriman offered as a suggestion that the 2-in. test piece be used only where it was impractical to get a standard 8 in. section. Dr. Dudley considered the specifications for axles utterly inadequate for such a railroad as the Pennsylvania. After considerable discussion the entire specification for axles was referred back to the committee for reconsideration.

Steel Tires.

There was practically no discussion on this specification. It was stated that it represented something far in advance of any American specification now in existence and was intended to embody the best features of foreign specifications. The specification was given a vote of approval as it read.

Steel Castings.

The first clause in the specifications for steel castings to be criticised was the one permitting "castings to be annealed or unannealed as specified." Messrs. Webster and Colby and Prof. Howe all argued for a requirement that all castings be annealed. The attention of the members was called to the fact that, especially abroad, a practice is arising of substituting steel castings in places where heretofore forgings have been exclusively used, and that the practice of using unannealed castings is unfortunately too common. The dangers attending the use of unannealed castings for important parts of machines was pronounced both unwise and dangerous. The committee was therefore recommended to revise the specification so as to require that all steel castings be annealed. Mr. Campbell's motion to reduce the percentage of elongation for hard steel castings from 15 per cent. to 10 per cent. and omit the requirement for contraction of area was lost.

The question of length of test specimen was again made the subject of considerable discussion. The specification was, however, approved as it read.

Wrought Iron.

Mr. Webster, Chairman of Committee No. 1, stated that the specification for wrought iron had not been given the attention and study that it should have received, and that it was recognized that the specification as offered was not at all satisfactory. The specification was therefore referred back to the committee for revision.

Steel Forgings.

At the Saturday morning session, Dr. Dudley stated that he believed the specifications offered by the committee for steel forgings were the result of careful and extensive study by the members of the committee and that they were recognized as something better than any other specification for forging issued to date.

Mr. Colby called attention to the divisions into which the specifications are classified, providing for seven different classes of forgings and these divisions further subdivided so as to cover limited ranges of sections under the different classes. For illustration there are provisions for soft, or low carbon, steel; higher carbon steel, annealed not annealed, and oil tempered. Also for solid and hollow forgings, under 6 in. diameter, between 6 in. and 10 in. and between 10 in. and 20 in. diameter. It is also provided, that for certain classes, the tensile tests shall include the determination of the elastic limit by means of an extensometer instead of simply noting the "yield point" by the drop of the beam of the testing machine.

Mr. Webster remarked upon the single limit in each case for ultimate tensile strength, that being the minimum strength required. It was conceded that the requirements for elongation and contraction of area called for would prove safeguards against brittle steel being passed.

Prof. Howe suggested the possible desirability of a sliding scale being added to the specification permitting the elongation to vary with the change in percentage of carbon, in order to provide for higher carbon steels than are now made or perhaps contemplated.

Mr. Colby was of the opinion that the highest carbon now in use or likely to be, will permit of the elongation specified.

With regard to the subject of the size of test specimens, Prof. Merriman's motion was adopted that the entire subject be referred back to the committee with instructions to undertake a series of experiments to determine the relations existing between the usual 8 in. test specimen and the 2 in. test specimen, having a diameter of ½ in. Also to investigate the existing data on this subject.

Mr. Colby, for the Bethlehem Steel Co., tendered the facilities of their testing laboratory for those experiments free of any expense to the association. He also stated that the extensive records of tests on both sizes of specimens in their testing department would be cheerfully offered to the committee to aid the investigation.

Mr. Webster called attention to the necessity in this connection of making determinations of the effects of different rates of speed in making tests for different sizes of test specimens.

Mr. Kreuzpointner raised the point that the methods of testing and the size of test specimens adopted for such expensive and carefully made steel as armor plate and guns should not be considered as at all applicable to the testing of the lower grades of commercial steel with which the ordinary consumer has to deal.

On the motion of Mr. Condron the subject of how best to bring the work of the association to the attention of the engineering and other technical societies, and get the widest discussion of the proposed specifications, was referred to the executive committee with the suggestion that certain members of the association, who were likewise members of other societies, be requested to present, in the form of papers before such societies, the subjects under consideration by the association.

Committee No. 1 was thanked for its earnest and successful labors and requested to have the specifications revised and submitted for adoption at the next annual meeting of the association. This concluded the business of the annual meeting, which was then adjourned.

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

CONTRIBUTIONS—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

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In our news columns, during the month of October, orders were noted for 12,552 cars of all kinds and 144 locomotives, which is the largest monthly record for car orders this year; more locomotive orders were noted during each of the first four months of the year, but the October record is far ahead of any recent month. The unusual total of cars ordered during the past month is, of course, due to the Baltimore & Ohio's buying 9,000 cars. The car orders are divided as follows: Box, stock and refrigerator cars, 3,358; coal cars, 8,590; flat cars, 550; tank cars, 6, and passenger cars, 48. Of the locomotives, 68 were for passenger service, 67 for freight, 1 for switching service and 8 for export.

The Census and the Railroads.

The census of 1900 finds the population of the United States to be 76,295,220, an increase of 13,225,000 over the population in 1890, or a little less than 21 per cent., while the increase from 1880 to 1890 was 25 per cent., and from 1870 to 1880 30 per cent. Even in the decade from 1860 to 1870, when the people of this now united country devoted their chief energies for four years to killing each other, the increase in population was 22.7 per cent. It was simply impossible that the increase could continue at its old rate; but few suspected that the rate of increase would decrease so fast, and official estimates generally gave the population as larger in 1898 than the census shows it to have been this year.

Immigration has been less in the last decade than in the previous one; but this accounts for only a part of the change. The chief factor is a falling-off in the birth-rate, which almost always occurs when an agricultural country, with a great extent of unoccupied land, is transformed into a manufacturing country. If the rate of increase between 1870 and 1880 had continued we should have had about 85,000,000 people in this country now. As it is, the growth of population here is still much more rapid than in any other large country, but the change in the rate is a significant fact, to be held in mind in all industries, and not least in the railroad industry.

We had here last June about 396 people to support each mile of railroad; if the old rate of increase had continued we should have had 442, which would have made it come easier. Fortunately, after long and sorrowful experience, we learned about ten years ago that we can build too many railroads. It is well to bear in mind that the increase in population in the last decade was just about 1.9 per cent. per year, and that an addition the current year of 3,658 miles in our railroad system will keep pace with the population. But there have been years when we have built 8,000 to 13,000 miles, and suffered for it. From 1890 to 1899 our railroad mileage increased less than 16 per cent.; the population nearly 19 per cent.

The census figures give a solid basis for computations of the amount of traffic per inhabitant in this country, which we have made heretofore for the estimated population. The population in June, 1899, was 74,870,000. During the year then ending the aggregate traffic on the railroads of the country was 14,591 millions of passenger-miles and 123,667 millions of ton-miles, which is at the rate of 191 passenger-miles and 1,621 ton-miles per inhabitant.

The passenger traffic per inhabitant is lighter now than formerly. In 1890 even it was 188 miles per inhabitant; in 1893, 213; in the following year (which included most of the World's Fair travel), 210. This figure fell to 176 in 1895 and to 170 in 1897; so that the recovery since is notable. Without a doubt hard times reduce the amount of traveling immediately and greatly; but the effect of the collapse in 1893 was not so great as the above figures indicate, because this was a period of a very great extension of suburban street railroads, on which the travel has increased immensely. All the more is the recent increase in travel on the steam railroads significant, as it has been co-incident with a great growth in street railroad travel. The 191 miles of travel per inhabitant may be compared with the 201 miles in the German Empire in 1898. Very likely if we included suburban street railroad traffic, which is of the same nature, we would find more travel per inhabitant in this country; but it remains remarkable that this amount increased 90 per cent. in Germany in the last ten years and scarcely at all here.

But the significant, the astounding figures are those showing the freight traffic per inhabitant. That for every man, woman and child in this country a ton of freight should be carried 1,621 miles seems almost incredible, and marks this country as preeminently the country of transportation. In Germany, which has more railroad freight traffic than any other European country reporting, and per inhabitant probably more than any other, except, perhaps, little Belgium, the amount in 1898 was 388 ton-miles per inhabitant.

The great amount of transportation here is largely due to the distances freight is carried, but largely also to the great average production per inhabitant which naturally is greater where the population is largely engaged in mining coal and iron ore, quarrying stone, producing the coarser manufactures and the raw produce of the soil than where they are mainly engaged in the finer industries. Aside from which, doubtless, the average man is a more efficient producer here than in Europe. He makes more goods, consumes more goods, and the goods are carried further.

Heretofore we have had no means of knowing the total average distance freights are carried in this country; each railroad, reporting for itself alone, gives the number of tons hauled and the aggregate distance hauled on its own lines; but as a very large part of the frieght passes over two or more roads, this bears but a slight relation to the average haul for the country. In the 1899 report, however, the Inter-State Commerce Commission has had a separate statement made of the tons received from connecting routes, and the remainder, 510 millions, is approximately the number of separate tons of freight. The average haul of these was 242½ miles, which is nearly four times as great as the average haul in Germany. Evidently here more than anywhere else railroad transportation is an element in production.

Annual Reports.

Union Pacific.—The report of the Union Pacific for the year ended June 30 last is received. The gross receipts from operations were $39,148,000 and the net receipts $17,720,000. After adding interest, dividends and miscellaneous income the total available for fixed charges and dividends was $20,464,000. After payment of interest and sinking fund requirements there remained a surplus of $12,588,000, out of which dividends were paid to the amount of $7,744,000, leaving a balance carried to the income account of $4,844,000. Four per cent. was paid on the preferred stock of the Union Pacific and 3½ per cent. on the common. Four per cent. was also paid on the preferred stock of the Oregon Railroad & Navigation Company. Of course, most of the interest on Oregon Short Line bonds and much of the dividends to the Oregon Railroad & Navigation Company preferred came back to the Union Pacific treasury and appear in the income account.

The gross receipts on the Union Pacific, the Oregon Short Line and the Oregon Railroad & Navigation Company increased 11.56 per cent. The operating expenses (excluding betterments and equipment) increased 9.72 per cent. and the net receipts increased 14.4 per cent. The average mileage operated by the three companies increased 11.16 per cent., amounting to 5,428 miles.

One of the most interesting of the facts brought out in this report is the statements of the betterments and improvements going on. During the year a total of $8,977,000 has been expended by the three companies for betterments and new equipment, namely, $6,309,000 for betterments, $2,268,000 for new equipment. This includes $3,503,000 expended on the Union Pacific on account of changes of line, where one of the most important improvements is now going on that has ever been made by an old railroad. When these improvements are completed about 198 miles of the line between Cheyenne and Ogden will be abandoned, exclusive of 7.4 miles, which will be retained as a branch to the Carbon coal fields. The revised line authorized, completed and under construction between Cheyenne and Evanston, amounts to 158.98 miles. The saving in distance by the change will be 30.51 miles, and 6,867 degrees of curvature will be saved. The saving in gradients amounts to 54.38 ft. per mile on the new line between Beauford and Larrabee, 32 ft. per mile between Hanna and Dana, 27 ft. per mile between Rawlins and Tipton, and less amounts in other places. The new work is progressing rapidly and part of this year's work was to have been ready for use by Oct. 15.

Besides this extraordinary revision, 42 miles of second main track was authorized and put under construction during the year in order to relieve the congestion at main-line district terminals, and about 30 miles of new side tracks were laid. The total mileage of the lines of the three companies ballasted during the year amounted to 1,077 miles, and 34,000 tons of new steel and 31,000 tons of second-hand steel and 4,600 tons of second-hand iron were laid. The renewals of cross ties amounted to 2,266,000, and very extensive repairs and renewals were made to bridges and culverts. Some of these items are as follows: Steel girders amounting to 1,633 linear feet took the place of 40 timber and pile bridges. Heavier structures to the amount of 1,923 ft. replaced 12 iron and steel truss bridges, while 317 timber and pile bridges were replaced with 21,171 ft. of bank and 13,156 ft. of iron pipe culvert was built. The effect of these and other changes was to reduce the aggregate length of timber bridges by 17,400 ft., and to increase the length of permanent bridges 4,076 ft., making a net reduction of 13,324 ft. in the aggregate length of bridges in the roadway of the companies named.

On the Union Pacific proper the receipts from freight amounted to 16½ million dollars, the increase in the year having been 16.65 per cent., while the tons of revenue freight carried increased 11.77 per cent. The ton-miles per mile of road amounted in the year to 537,782, there having been a decrease of 6.53 per cent. This traffic is pretty dense for a transcontinental road, as will be seen when we say that the ton-miles per mile of line for all of the railroads of the United States amount to 659,565. The average trainload increased materially, namely, 10.98 per cent., having reached (including company freight) 343.8 tons. On the Oregon Short Line the volume of freight traffic was relatively somewhat less dense, averaging 512,721 ton-miles per mile of road. The trainload, however, was 392.39 tons (also including company freight). The increase in this case as compared with the year before was 21 per cent. On the Oregon Railroad & Navigation Company's lines the revenue ton-miles per mile of road amounted to 320,173 and the trainload, including company freight, was 337.16 tons. The load of revenue freight was 308.14, an increase from the year before of 44.8 tons, or 17 per cent.

Baltimore & Ohio.—The record contained in the annual report of the Baltimore & Ohio for the last fiscal year is one of exceptional prosperity. Material evidence of this prosperity was given to the security holders in July by the declaration out of the earnings of the year of a 4 per cent. dividend on the new common shares of the company. The payment of such a dividend in the first fiscal year of the reorganized company is an evidence of financial strength perhaps hardly anticipated by the reorganizers when they issued their successful plan in June, 1898. The elements contributing to the company's great prosperity are quite clearly brought out in the present statement. They go back a good deal beyond the last year to the policy of the Receivers in adding to the company's facilities for handling freight, in reducing the cost of transportation, and in developing industries along the line. As evidence of what has been done in the latter regard it may be pointed out that the 28,366,700 tons of freight carried on the old Baltimore & Ohio line is more than double the tonnage in 1894 and considerably more than double the freight traffic in any year preceding 1891. As evidence of the success of the company's administration in handling this freight profitably it may be pointed out that the cost of transportation movement reported for the 1900 fiscal year is $12,884,000, compared with $9,200,000 in 1895, the year before the receivership, when only 16,080,000 tons were carried.

Excluding the Baltimore & Ohio Southwestern, the Baltimore & Ohio last year earned gross from operation $34,890,227. This was less in the aggregate than any of the other leading trunk lines, but the gain, however, was the largest, being $6,485,000, or 22.83 per cent. In net earnings the increase was $5,737,800, or 86.65 per cent. These comparisons are affected to some extent by changes in accounts and in mileage. By taking over several lines in West Virginia and the construction of branch road, the mileage operated increased from 2,047 miles on June 30, 1899, to 2,278 on June 30, last. Per mile of road, gross earnings were $15,438 in 1900, an increase of $1,278, or 9 per cent., and net receipts were $5,469 per mile, a gain of $2,167, or nearly 66 per cent.

The balance available for interest was nearly twice as large as last year, being $13,164,277. The disposition of this income is interesting, the whole sum being appropriated. Interest, rentals and taxes absorbed $6,634,932; a preferred dividend of 4 per cent. was paid, calling for

$2,400,000, while a dividend on the common shares added $1,673,560 to the expenditures. This left a balance of $2,455,785, of which $307,456 was charged off for discounts and commissions and the remaining $2,148,329 was appropriated for betterments.

In accordance with the reorganization plan of the Baltimore & Ohio Southwestern, that property was formally merged with the Baltimore & Ohio on July 1 last, adding 922 miles to the operated road.

A summary of betterments would take considerable space. There were over 30,000 tons of rails laid, at a cost of $626,000; 952,000 cross ties were put in the track at a cost of $350,900; 58 miles of side track were built; over 3 1-3 million cu. yds. of masonry built; 117 bridges and culverts were erected, and 583 miles of road were ballasted. Total improvement expenditures were $3,034,754, of which $886,425 was charged against capital and the rest against the year's income. Besides reduction of grades, double tracking, bridge erection and other work of that character, last year's expenditures included the cost of important extension of terminal facilities at Curtis Bay, Baltimore and other points.

The number of tons carried was 28,367,000, an increase of 13¼ per cent., and ton-miles were 5,847 millions, or 13⅞ per cent. above last year's total. In 1899 the increase in ton-miles was 775 millions, or 17¾ per cent., so it will be seen how heavily the Baltimore & Ohio has been adding to its tonnage in recent years. Since 1897 the record of ton-mile movement is as below, in millions:

1900	1899.	1898.	1897.
5,847	5,137	4,362	3,499

In 1897 the average ton-mile rate was 5.24 mills; by 1899 it had dropped to 3.90 mills. The increase in soft coal, coke and other low-grade freight had a good deal to do with this falling average, but in 1900 coal contributed slightly and other freight more largely to bring up the average rate to 4.57 mills. On soft coal alone Baltimore & Ohio's average rate was 2.77 mills per ton-mile, against 2.64 mills in 1899. With these higher rates the increased business was handled with a relatively small addition to freight train mileage, only 729,000 miles additional, excluding switching mileage, being an increase of 5 per cent. to haul, an increase of 709½ million ton-miles or nearly 14 per cent. more than in the previous year. This enabled the company to increase its average freight train load 30 tons to 372 tons. On the Pittsburgh division an average train load of 383 tons is secured, and on the trans-Ohio lines 70 tons were added to the average train load in the year. In 1898, when this figure was first compiled by the company, the average for all lines was 314 tons. With increasing rates and train loads freight train mile earnings make an excellent showing and were $1.69 in 1900, against $1.34 in 1899.

Detroit & Mackinac.—This railroad is only 325 miles long, including 77 miles of logging branches and spurs, and its gross earnings in the year ending June 30 last amounted to but $834,000, and yet it is a road of quite unusual interest. It was reorganized in 1894 and since then has been extended and worked with the special purpose of developing the shore counties in the northeast of the Lower Peninsula of Michigan. It has reached a point in Cheboygan County and an extension to Cheboygan on the lake is planned, this to be carried eventually to Mackinaw. Spurs are being pushed out to tap new country and the physical condition of the road is being constantly improved. In the year under review 150 gondola cars of 80,000 lbs. capacity were received and 150 more of the same capacity ordered. Three thousand tons of 75-lb. rail was laid, the 56-lb. rail which was taken out being used for logging branches. Grades have been reduced and the heavier cars, heavier locomotives and lighter cars have permitted an increase in the freight trainload from 131 tons in 1899 to 189 tons in 1900. Freight train earnings increased from $1.47 to $1.97. It is proposed to build docks on the water front owned by the company at North Bay City on Saginaw Bay for shipment of coal mined in the Saginaw Valley; and another industry tributary to the traffic of the road and important for the country is that of making cement, a plant having just been built for that purpose at Alpena. The betterments during the year amounted to $222,000, $94,000 of which was charged to operating expenses, $29,000 to cost of road and $99,000 to equipment. The gross earnings in the last fiscal year amounted to $834,000, the expenses to $555,000, and the net earnings to $279,000. In 1897 these figures were respectively $407,000, $305,000 and $102,000; that is, while the gross earnings have increased in the four years by 105 per cent. the net earnings have increased 173 per cent. Meantime, the mileage worked has increased from 285 to 325 or 14 per cent.

Railroad Building in Mexico.

During the first six months of this year, according to the figures recently published in the *Railroad Gazette*, Mexico added 464 miles to her railroads. This was more than was added in the entire year of 1899, 267 miles, and nearly equaled the increase in 1898, which was 495 miles; in 1897 it was 317. For similar figures we must go back to 1890, during which year the increase was 498 miles. During the years 1891 and 1892 there were added 361 and 310 miles respectively. Then came the panic of 1893 which affected railroad building as severely in Mexico as in our own country. Only nine miles of new road are recorded for Mexico that year; she added 40 miles in 1894, and 76 in 1895.

Railroad building for the immediate future promises to be active in Mexico. Our Construction Supplement of July 27 last showed 51 new lines and extensions, either building or projected, by 42 companies; on 22 of these work is in progress. Six months ago there were 19 lines building in Mexico, a year ago there were 13, and eighteen months ago only 6. The new road building or under contract at present aggregates 1,100 miles.

Prominent among the old companies building extensions through Mexico is the Mexican Central. During 1898 the company completed a branch through Chihuahua from Jimenez southwest 55 miles to Parral. The intention is ultimately to extend the branch on southwest about 200 miles to a harbor on the Pacific. The difficulties of surmounting the Sierra Madre range, however, are extreme and it is doubtful whether the present development of the country would warrant the outlay. Meanwhile the valleys east of the mountains are attractive. Last year a line was begun at Parral, which is to extend southeast about 175 miles via Rio Florida and into the State of Durango.

The International is building a branch from Durango northwest into the same territory. Eighty-two miles to Chinacates has been completed and the company is building on to Santiago Papasquiaro, about 25 miles more. The road may in time be continued northwest over the mountains to Guaymas on the Pacific. Meanwhile the International is continuing its line from Durango southwest toward Mazatlan, another port on the Pacific. This will require about 150 miles of road, of which 15 miles is graded.

The Mexican Central is building another line which is intended ultimately to reach the Pacific. It leaves the main line at Irapuato, State of Guanajuato, some 353 miles northwest of Mexico City, and runs due west 207 miles via Guadalajara to Ameca, which is only about 75 miles from the coast. It has just been extended 17 miles beyond Ameca to San Marcos. From Guadalajara, on this branch, 161 miles from the main line, the company is building a line south about 100 miles to Zapotlan. It is being graded to Zapotlan and for 15 miles beyond, and track is laid for 33 miles. It is to be extended to Colima, in all 162 miles. There connection will be made with the line of the Mexican National Construction Company, which runs to Manzanillo, a harbor on the Pacific coast.

Several years ago the Mexico, Cuernavaca & Pacific, under valuable concessions from the Mexican Government, began building a line from the city of Mexico south 335 miles to Acapulco, a Pacific harbor. It has been completed through Cuernavaca and Iguala to the Rio Balsas, 181 miles, and work is being pushed south of the river.

The Mexican Southern is interested in several new branches. One is an extension of the Tlacotepec & Huajuapam de Lean line from Las Pilas, Puebla, southwest 52 miles to Acatlan. It is owned by Sr. Luis Garcia Teruel, but is operated by the Mexican Southern. Some 19 miles of track is laid, and the grade is completed for 12 miles more. Another branch building by Sr. Teruel is from Oaxaca, terminus of the main line, to run south about 50 miles to Ejutla. The first section of 19 miles will be opened in a few months. The company has projected an extension from Oaxaca southeast about 150 miles to Tehuantepec. This will give connection with the National Tehuantepec line which is being rebuilt by Pearson & Co., English contractors. The National Tehuantepec is 193 miles long and connects the harbor of Coatzacoalcos, on the Gulf of Mexico, with Salina Cruz on the Pacific. Extensive improvements are being made in the harbors. When the entire work is done, Pearson & Company will have the shortest Mexican line connecting the two oceans.

Another line which proposes to connect with the National Tehuantepec is the Vera Cruz & Pacific. It is projected from Cordova, on the Mexican Ry., about 66 miles west of the harbor of Vera Cruz, and is to run southeast 218 miles via Motzorongo and Evangelista to Santa Lucrecia, on the National Tehuantepec. Building is completed from Cordova to Tierra Blanca, 56 miles, and work is in progress to the Papaloapam River, 31 miles further. A branch is also building from Tierra Blanca north 61 miles to Vera Cruz. Another branch is projected to Valle Nacional, 62 miles. This road is being built under a concession to Alfred Bishop Mason, of Baltimore, Md. The Maryland Trust Company, of Baltimore, is the American financial agent. By the terms of the concession 100 km. (62 miles) must be completed before Dec. 15, 1900, another 100 km. a year following, and the entire road by Dec. 15, 1903.

Two lines are building from Saltillo through the State of Coahuila. The Coahuila & Pacific is to run from Saltillo, which is a junction point of the Mexican National and the Coahuila & Zacatecas, west 203 miles via Zepeda, Parras and Viesca to Torreron, connecting with the Mexican Central and the Mexican International. Much of the way it is to parallel the Mexican International. Preliminary surveys are approved by the Mexican Government and location is under way. Grading is practically completed on the first 42 miles out from Saltillo to Patos, and track is laid for about 14 miles. The Coahuila Central is to run from Saltillo northwest about 200 miles via Ramos Arispe, and Trevino to Sierra Mojada. It has been graded to Ramos Arispe, 10 miles, and permanently located to Trevine, 60 miles. United States capital is interested in both lines.

A railroad, known as the Potosi & Rio Verde, is building from San Luis Potosi, where the Mexican Central and Mexican National intersect. It is to run southeast 100 miles to Rio Verde. Rails are laid for 32 miles out from San Luis Potosi. The San Marcos & Tecolutla is projected from San Marcos northeast 155 miles to the Port of Tecolutla on the Gulf of Mexico. It has subsidies from both the Federal and the Puebla Governments. The road is completed to Teziutlan, 62 miles. It may be extended from San Marcos west about 30 miles to Puebla. The Xico is a narrow-gage road completed last year from Mexico City northeast about 35 miles to Ecatzingo, and is being extended toward Atlixco, State of Sonora.

The Interoceanic of Mexico is building a connecting link from Cuautla, State of Morleos, to run southeast 39¼ miles to Atencingo on the Matamoras branch. Trains now run from Puente de Ixtla, connecting point of the Mexico, Cuernavaca & Pacific, to Vera Cruz, by way of Mexico City. When the cut-off is completed, it will save 87½ miles. The Nacozari is a new line incorporated in New Jersey, which is building from Naco, on the Arizona boundary line, south 75 miles to Nacozari, in the heart of the mineral region. It is supposed to be an extension of the Arizona & Southeastern. The Chihuahua Mineral is building a line from Santa Eulalia northwest about 19 miles to Chihuahua City. It is completed to Hacienda Robinson, 11 miles. The company will also build a number of branches to connect with the mines in the district of Eulalia. The Mexican Ore Company of Chihuahua is interested.

A line has just been completed by the Chihuahua & Pacific from Chihuahua west 124 miles to Guerrero. Preparations are being made to extend it 300 miles further to Topolobampo, or Port Stillwell, a harbor on the Pacific. This line is to form a part of the Kansas City, Mexico & Orient, which is projected by Arthur E. Stillwell, who was the principal projector of the Kansas City, Pittsburgh & Gulf, now the Kansas City Southern. The new line is projected from Kansas City southwest through Kansas, Oklahoma, Texas and Mexico to the Pacific. Contracts are reported awarded for the first 65 miles from Port Stillwell, Mexico, northeast to El Fuerte and toward the Guerrero end of the Chihuahua & Pacific. Some grading and tracklaying have been done also on the United States end of the line.

In the Peninsula of Yucatan are likely to be some rather important railroad extensions. American capital is interested in the Southeastern of Yucatan. This line is projected from Peto, State of Yucatan, southeast 90 miles to the Bay of Assuncion, with branches northeast 30 miles to Valladolid, and south 120 miles to Belize in British Honduras. Capt. Porfirio Diaz, of Mexico City, a son of President Diaz, is building 35 miles from Peto to Saban. Capt. Diaz is building another line in the same state for the Merida-Peto. It is a branch from Acanceh southeast 55 miles to Sotuta. The Merida-Valladolid has built 89 miles of its line from Merida, Yucatan, east to Tunkas, and is asking bids for 42 miles additional, which will complete it to Valladolid. It is also asking bids for a branch from Citas, on the main line, northeast 42 miles to Tizimin. This section of Mexico has heretofore been one of the slowest of development.

At the end of 1898 Mexico had 8,498 miles of railroad, according to the figures of the *Archiv fur Eisenbahnwesen*, which recently appeared in the *Railroad Gazette*. This was an average of but four-fifths of a mile per 100 square miles of territory, and 6¼ miles to each 10,000 population. At the same time the United States had 7½ times as much mileage in proportion to area, and more than four times as much in proportion to population. The new mileage added in Mexico, since Jan. 1, 1899, brings her present total above 9,200 miles. This serves a territory of 767,000 square miles, which is a little over one-fourth the area of the United States, exclusive of Alaska and other outlying possessions. Her 13 million population are about a sixth of our own. Apparently, therefore, there is yet room for growth in the railroads of Mexico.

A report made by the Interstate Commerce Commission on a complaint that the Philadelphia Car Service Association did not allow sufficient free time for unloading grain, was noticed in the *Railroad Gazette* of Oct. 26. The full report, since received, gives some particulars concerning the practice of this Association. Much of the discussion at the hearing had to do with the different allowances of free time on different commodities. On grain at Philadelphia the allowance is 96 hours and the same is granted on hay and perishable freight, but in the interior all these commodities come under the 48-hour rule. On coal, pig iron and iron ore 72 hours is allowed in the interior. The evidence tended to show that on more than 90 per cent. of the grain delivered at Philadelphia the actual time allowed for unloading was only about 48 hours, the first two of the four days being consumed in the inspection of the grain, in the negotiations between the buyer and seller at the Commercial Exchange, and in switching the car. Over 300 firms in the territory of the Philadelphia Association take advantage of the regulation offered by the railroads under which their cars shall be charged for under the "24-hour monthly average." A firm receiving a number of cars and unloading the whole of them promptly enough so that the detention does not average more than 24 hours for each car, pays no demurrage, even though some of the cars may have been detained more than 48 hours. In refunding charges in consequence of bad weather the Baltimore Association makes allowance only in the first 48 hours, that is to say, in the free time; while the Philadelphia Association makes allowances after the expiration of the free time. No allowance whatever is made, however, on 96-hour commodities. It appeared in the evidence that of $30,000 collected by the Northeastern Pennsylvania Car Service Association in the year 1897 one-third was refunded. The manager of a large mill at Wilkesbarre testified that he

often had to unload cars at night to avoid paying demurrage. In this association, the Northeastern, the allowance of 72 hours on coal and iron is made, it is said, because shipments come irregularly and because the cars are rarely used for return shipments.

It will be recalled that the gist of the decision of the Commission was that 48 hours was a reasonable allowance of free time if it were computed from the time the cars were actually ready to be unloaded and notice had been given. The rate per day is not touched upon in the ruling of the Commission. In this connection the reader will have observed that on the Great Northern Railway, whose regulations were also published in the *Railroad Gazette* the rate is $2 a day after 24 hours; at Philadelphia, and we believe at all eastern points, the rate is $1 a day; and in New England the free time is 96 hours on everything. Whether $2 has been the rate heretofore on the Great Northern we are not informed, but the fact is worthy of note that cars are worth more in Dakota than in Pennsylvania. Or, more correctly, it is worthy of note that a rate higher than $1, having been found necessary, is being collected. As every one knows, cars are frequently worth $2 a day, and much more, at Philadelphia, New York, and everywhere that freight shipments are pressing, as is the case at the present time on many of the roads east of the Missouri and north of the Ohio Rivers. It would be perfectly equitable for all demurrage bureaus to raise their rates when cars are scarce; and, of course, the rate should be reduced when cars are plenty, if the regular rate is higher than is necessary to keep team-yard tracks from being overcrowded. But changes in the rate would produce a great deal of friction, and if one uniform rate throughout the year is acceptable to consignees and loaders it is perhaps just as advantageous to the railroads as would be any scheme to adjust the rate to the varying needs of the service. It is matter of congratulation that the Interstate Commerce Commission, after an apparently thorough inquiry, has found no occasion to criticise the rates charged in Pennsylvania or the general administration of the Bureau. The various lawsuits that have been decided in local courts here and there do not seem to have settled the law so satisfactorily as was hoped for. The decisions have been always or nearly always in favor of the railroads, but each decision has been confined so closely to the facts of its own particular case that, speaking of the country at large, we are still without a judicial opinion dealing with the subject in a broad way. This being so, the negative encouragement which is to be derived from the silence of the Commission, in this case, on the subject of rates and other points, is worthy of mention.

The London & Southwestern Railway, of England, has decided to put in a pneumatic interlocking plant, the Superintendent of the road, Mr. Fay, having recently made a visit to this country to examine power signaling, and having made, on his return, a favorable report which has resulted in this decision by the directors. This information comes in a press dispatch published last Sunday. From information which we get nearer home it appears that the system adopted by the South Western is the low-pressure pneumatic of the International Pneumatic Railway Signal Company, of Rochester, N. Y., and which is controlled for the United States by the Standard Railroad Signal Company, of Troy. The reader will recall that an elaborate exhibit of the apparatus of this system was made at the Paris Exposition. It was described in the *Railroad Gazette* of May 25 last. Mr. John N. Beckley, President of the International Company, has visited Paris, London and other European cities during the past summer, and we conclude that the introduction of the low-pressure apparatus in England, which is now announced, is a result of his visit. Moreover, the L. & S. W. installation appears to be only a beginning. Mr. John P. O'Donnell, of London, who is well-known to our readers, has lately been here and has examined the various low-pressure plants now in service, and as a result the International people are to at once establish a company in England, of which Mr. O'Donnell will be the Chairman and Managing Director. This company will become the owner of the rights for making this apparatus throughout Great Britain and her colonies, except those in the Western Hemisphere. We understand that the new company is not to establish a factory, but will contract for all its material and machinery with the firm of Evans & O'Donnell. Mr. Charles Hansel will be Consulting Engineer to the new company.

NEW PUBLICATIONS.

Street Pavements and Paving Materials; A Manual of City Pavements, the Methods and Materials of Their Construction; for the Use of Students, Engineers and City Officials. By George W. Tillson, C. E., Principal Assistant Engineer, Department of Highways, Brooklyn, etc. Octavo, xii., 532 pages, 73 tables, 60 illustrations, index. New York: John Wiley & Sons. 1900. $4.

In Mr. Tillson's preface he explains that he has spent the past 20 years in municipal work and especially in pavements, and that, considering the very meager and already antiquated literature on the subject, he feels justified in the attempt to produce a book showing what is being done in construction, and also showing the evolution of the modern city street. Aside from his actual work in building and maintenance he has been a student of the history and literature of pavements and has produced a logical well ordered and comprehensive book.

A chapter of 14 pages is given to the history and development of pavements, beginning, of course, with Egypt, and ending with the great American cities. Four chapters treat of paving materials, namely, stone, asphalt, brick-clays and cement. The occurrence of these materials, their nature and the methods of preparing them are given. Another chapter deals with the theory of pavements and then follow five chapters, each devoted to one kind of pavement, as, for instance, cobble and stone block pavements, asphalt pavements, etc. There is a chapter on plans and specifications, one on street car tracks, one on the width of streets, roadways, etc., and finally a chapter describing various existing asphalt making plants.

In the chapter on the Theory of Pavements the author lays down and discusses the qualities which a pavement should have, this discussion being an attempt to arrive at a set of general principles which can be applied to the study of any particular case, and this will at once strike the engineer as being the proper way to proceed. The qualities which are considered in this analysis are cheapness, durability, ease of cleaning, resistance to traffic, slipperiness, ease of maintenance, favorableness to travel and sanitary qualities. We do not understand that the author places these qualities in this order as being the relative order of their importance, although we suppose it is at least approximately his idea of their relative rank. Under each of these qualities is some discussion of its relative weight and then the various materials and methods of paving are considered with regard to their possession of these fundamental qualities. The materials treated in this particular analysis are granite A, being oblong granite blocks laid on concrete with tar and gravel joints; granite B, or granite blocks on a sand base with sand joints; asphalt, brick, Belgian blocks, macadam and cobblestone. From this relative analysis the author omits wood "because it is at present being laid in but a few Western cities, and untreated cannot be considered as a paving material. It has also been laid in so many different ways and of so many varieties that each case would require discussion by itself." We judge that this dismissal of wood from this comparative analysis will hardly be satisfactory to most readers, but the topic of wood as a paving material is well treated in a chapter of 36 pages, and the reader can use his own judgment in assigning to wood its relative place as a paving material. The upshot of Mr. Tillson's analysis is to put asphalt first with 76 per cent. as the sum of the percentages assigned to the various qualities. This is followed by granite A, brick, granite B, Belgian blocks, macadam and cobblestone in this order, the percentage of granite A being 69 and of brick 67. Or, if asphalt is taken as the standard with a value of 100, the others will be granite A, 91; brick, 88; granite B, 74; Belgian, 68; macadam, 59, and cobblestone 58. Whether or not this interesting analysis will be accepted as final is, of course, a matter of minor importance. Its real importance is that it is an attempt to make a rational comparative analysis.

It would be impracticable to go on and give the substance of each of the chapters, but what we have said is enough to indicate the thoroughness of the author's treatment and the scientific habit of his mind. The result has been to produce a book full of precise information and abounding in good reasoning and suggestion.

The Transportation Question as Affected by the Cullom Bill. By Edward A. Moseley, Washington, D. C. This pamphlet of 18 pages contains an address delivered before the Pennsylvania Millers' State Association at Atlantic City, N. J., September 13. Mr. Moseley, as everybody knows, is the Secretary of the Interstate Commerce Commission. In this address he has dealt with the question of state control, through the instrumentality of the Interstate Commerce Commission, in a series of clear and succinct statements, dividing his subject into the subtopics of Unreasonable rates, a Fair hearing for both sides, How to give the railroads additional revenue where necessary, Secret rate cutting, Publicity of accounts, Fines instead of imprisonment, Railroad service not a private business, Publicity of charges and Railroad consolidation and pooling. Mr. Moseley, like Mr. Knapp and others who have advocated the Commission's plan for dealing with the railroad problem, unduly minimizes the enormous difficulty of doing justice to shippers (and railroads), and has nothing to say on the question of how to permanently get a competent tribunal which shall have the dignity and standing of a court, and he fails to tell his hearers that changing the punishment to fines (instead of imprisonment) even with legalized pooling added, will probably be but an indifferent remedy for secret rate-cutting. That the added powers for investigating railroad accounts which the Cullom bill proposes will materially aid in exposing illegal rates, seems to us quite unlikely; and that we differ from Mr. Moseley as to the results which will follow the enactment of a law empowering the Commission to correct rates found unreasonable is already well known to our readers. But nevertheless the pamphlet is a fair setting forth, within brief compass, of the Commission's view of the present situation.

Handbook of the Electro Magnetic Telegraph. By A. E. Loring. New York: D. Van Nostrand Co. 50 cents. This is the fourth edition of No. 39 of Van Nostrand's Science Series, the first one having been issued in 1878. The present issue is a revision made by the author, containing a description of the duplex and quadruplex. The name of the publisher and the continued demand are a guaranty of the merit and usefulness of the book. The author writes in a clear and simple style, and his material is well arranged. The work is confined to elementary matter and to the Morse system; and, of course, is not exhaustive, but it embraces all of the essentials for young operators. There is a good index, but some of the cuts show signs of wear, and the plate from which the alphabet is printed is so imperfect that some of the letters and figures are incorrectly shown.

TRADE CATALOGUES.

Narrow Gage Locomotives.—The Baldwin Locomotive Works have issued a revised edition of their illustrated catalogue of narrow gage locomotives. It is an octavo volume of 452 pages with a good index and substantially bound. It contains a history of the Baldwin Works up to and including 1899. In that year the Works turned out the 17,000th locomotive. Thirty years were occupied in building the first thousand engines and the Works now have a rated annual capacity of 1,000, and the last estimate that we heard was that 1,200 would be built in the year 1900. The men employed number 8,000 and the horse-power is 6,000. Eight dynamos are used for power and 10 for lighting. The aggregate horse-power of electric motors for power transmission is 3,000. The weekly consumption of iron is approximately 2,000 net tons.

The book is so important in several ways and the history of the Baldwin Works alone is enough to justify putting it on the shelves of one's permanent library. The chapter on compound locomotives, which fills 59 pages, is also worth a place in the library. The volume contains the general specifications of the Works, class designations, and illustrations with dimensions, weight and capacity of locomotive engines. Most elaborate arrangements are made for code description of locomotives and all their parts for the convenience of foreign purchasers.

Westinghouse Railway Motors.—The Westinghouse Electric & Mfg. Co. has just issued, through the Westinghouse Companies' Publishing Department, Pittsburgh, a pamphlet designed especially to advertise the Westinghouse railway motors and containing also a few illustrations of typical railroad power stations. The makers say that experience has shown that the equipment of street railroad cars has generally been too low in horse power and that not enough attention has been given to the matter of temperature rise in the field coils as compared with that in the armature. In the latest types of the Westinghouse motors the temperature rise in regular service is the same in field and armature windings and other improvements are introduced. The pamphlet shows and briefly describes motors designed for a great range of work. These are shown assembled and in detail and also mounted. Copies of the pamphlet can be had from the Publishing Department.

Steel Rails.—The Cambria Steel Co., main office Fifteenth and Market streets, Philadelphia, Pa., works at Johnstown, Pa., issue a new catalogue of rail sections. This shows not only the sections carried and rolled by the company, but also splice bars, frog fillers and track bolts and nuts. It is interesting and gratifying to see the evidence of wide use of the American Society of Civil Engineers' section, particularly in the heavier weights. Naturally, the lighter weights are more often rolled to the old sections, as when people change the section they raise the weight.

Atlantic Type Locomotives.—The Baldwin Locomotive Works, Philadelphia, Pa., issue a pamphlet devoted entirely to the Atlantic type locomotive. It describes briefly the origin of this type of engine and the reasons for its development, and gives particulars of the performance of a good many individual engines on various railroads with letters from officers of those railroads. It will be interesting to those of our readers who have but little English to know that this pamphlet is printed in French as well as in English.

Pipe Threading and Cutting Machines.—The Merrill Mfg. Co., of Toledo, Ohio, sends a catalogue illustrating and describing the pipe threading and cutting machines made by that concern. These run through a considerable range of capacity and price and are well illustrated and described in the pamphlet.

Railroad Scrap.*

By J. A. Carney, *M. M., C., B. & Q. R. R.*

Some one has called railroad scrap the by-product of railroads. It is of such an infinite variety, and is so widely distributed, that to get it to a central point, properly sorted and ready for sale, at a minimum cost of handling, is a problem that, so far as I know, is yet to be solved. It is the purpose of this paper to touch upon a method of handling machine shop scrap from the time it is made until it is loaded for shipment to some central point, where it is sorted into grades which will bring a maximum price. From this standpoint scrap divides itself into (1) borings and turnings; (2) punchings and shearings, and odds and ends, weighing not more than

*Extracts from a paper read at October meeting, St. Louis Railway Club.

5 or 6 lbs.; and (3) large pieces. Borings and turnings should be collected in wooden trays set under the machine. The small quantity which falls outside the trays can be collected by the sweeper, who wheels the scrap to a bin where it can be conveniently loaded into cars. At one shop this bin is arranged something on the coal chute order. The bins are filled from a platform on one side, and are so arranged that they can be emptied into a car on the other side by means of a suitable chute or apron. By this method no shoveling whatever is done. The only sorting of this kind of scrap in most shops is to keep cast iron separate from steel and wrought iron.

Punchings, shearings, odds and ends should be put into boxes of about 200 lbs. capacity at the machine where they are made. These boxes, when full, are carried to the scrap shed, where they are piled up ready for shipment to the scrap dealer, or to a central point, where it is finally sorted. If the scrap is sold, the boxes are dumped into cars. If, however, it is going to some central point for sorting, the boxes filled with scrap are carried into the cars and piled. At the central point the scrap is unloaded in the boxes, sorted, and thrown into the scrap bins, the boxes being returned. The old method of piling scrap up on the ground, then, when the pile got in the way, moving it to some other place, handling it with a shovel or picking each piece up by hand, was expensive. Practice has developed that a 200-lb. unit is convenient to handle. The cost of handling small scrap by the old method amounted to about 20 cents per ton for each handling. By the box method it can be handled for about 6 cents per ton.

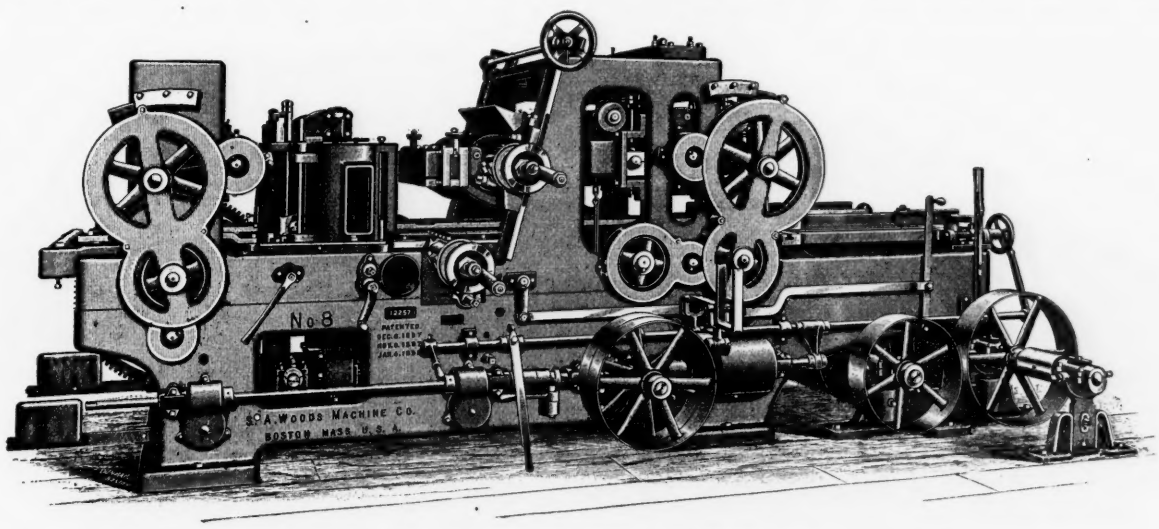
Where work on machines is fairly uniform the quality of the scrap made must necessarily be about the same. This scrap, when collected and stored in boxes, requires little sorting. In this way machine shop scrap, blacksmith shop scrap, and boiler shop scrap, especially that covered with scale and known as "lime" scrap, are kept separate, and can be sorted in 200-lb. units much quicker and easier than if each piece, weighing a few ounces, is handled separately. Therefore, by the box method, scrap is sorted at the place where it is made, and can be handled at a minimum cost.

The boxes are made of 1-in. unfinished pine, and are 24 x 14 x 5 in. deep, inside dimensions. The sides are extended to make handles for carrying, and the ends are bound with hoop iron. Pieces of scrap too large to go into boxes are economical units in themselves, and are handled a piece at a time. The box or unit method need not be confined to the machine shop, but is good anywhere for any kind of metallic scrap. It has been used successfully by section men in re-laying track. Instead of throwing old track spikes and bolts on the ground, to be picked up later, the old and worn out material is thrown into the box and the section men are relieved of the labor of going over the ground to pick up after the work is done. It may take a little more time to use boxes, but, if intelligently done, the loss of time is small and the saving in labor great.

Railroad ties form a considerable portion of railway scrap, and when removed from the track are dirty, more or less rotted out, and are very difficult to cut with a saw. It is the opinion of a great many railroad men that it does not pay to pick up railroad ties for fuel, and that the most economical method of disposing of them is to burn them alongside the right-of-way—this on account of the difficulty in working them up. One railroad is using a device for cutting up old ties which does it cheaply and well. It consists of a drop arranged somewhat on the order of a pile-driver, with an air-lift. The air cylinder has a large gate valve at the bottom, and, when opened, allows the piston-rod and weight to fall rapidly. The weight has a cast-iron wedge, steel-shod, on it, and will cut in two or split any oak or soft wood tie that has served its time in the track. By the use of a machine of this sort old ties can be cut up and piled for about 50 cents per cord. The principal cost is picking up old ties on the track and shipping them to a central point to be cut up. This cost varies with the length of haul. Where the cost of cutting up, plus the cost of picking up on the road, does not exceed the cost of cordwood, it is an economical practice. This is especially true of large yards, where the cost of transportation of the ties is small. Old ties, if dry, make good engine wood, and the cost can be regulated so that they will be much cheaper than cordwood. This paper has touched on but two points of the railroad scrap question. If the subject were treated exhaustively, it would fill volumes.

A Four-Side Planer and Timber Sizer.

Illustrated herewith is the new No. 8 four-side planer and timber sizer, built by the S. A. Woods Machine Co., South Boston, Mass. It is adapted to a large range of work, from matching boards to squaring timbers, and is the latest on the market, embodying all features of practical value that have heretofore given superior results and wearing quality. There are several features of adjustment that show progress in perfecting an all-round machine of large capacity. Among these, and worthy of mention, is the special wedge platen adjustment, by which the bed plate beneath the top cylinder, with lower carrying-in rolls and boxes, may be raised or lowered together and securely clamped, to obtain more or less cut to the bottom cylinder. This change is easily made from the feeding-in end. The advantage of this adjustment will be fully apparent when it is said that the surface cut may be distributed at will between top and bottom cylinders, and without disturbing cutter heads or rolls, or changing the finished thickness of the lumber.



S. A. Woods Four-Side Planer and Timber Sizer.

By special arrangement of cutterheads, a long rigid platen is afforded top and bottom cylinders, insuring superior planing to both surfaces. The bar after the top cylinder cut acts as an overhead platen for the under cylinder, moving with the top cylinder at all times unless special adjustment is required. The machine has a power hoist, by which the entire train of rolls and upper cylinder may be adjusted simultaneously, or top carrying-in rolls may be detached and operated simultaneously, when necessary to take an extra heavy cut. The upper cylinder and yoke may be adjusted independently by hand if desired, and locked firmly in place by lever at feeding-in end, which is so placed that power hoist cannot be operated until the cylinder yoke is released.

All feed rolls are weighted from below, leaving the upper works of the machine entirely free from overhead weights or springs. Both surface and side-head chipbreakers, and also the pressure bars, have sufficient expansion to permit of swinging overhanging cutters. Square jointer or matcher heads may be used on the side spindles, the matcher heads having vertical adjustment. The spindles are equipped with heavy top bearings. The chipbreakers and spouts are hung to permit of swinging to one side. Piping to exhaust is facilitated by the location of these works. The side-head frames are quickly and securely clamped into place by a good locking device, and are so hung that they may be readily removed from the machine by unclamping, and without disturbing the screws or other connections. A scale is provided, which is set into the upper cross girt, and facilitates quick and accurate setting for desired width. The feed may be stopped or started from feeding-in end or working side. The feed rolls, six in number, are 9 in. diam., and driven by a satisfactory method of gearing, insuring positive results under all conditions. The two top carrying-in rolls are divided in two sections, and have chipbreakers to conform. A center guide of improved form is furnished, and removable spring lever guides for holding stock thereto. All cutter-head and side-spindle pulleys are of patent pneumatic type, used only by the S. A. Woods Machine Co. The machine is built to work 24 in. or 30 in. wide, 14 in. or 16 in. thick, and several are now in operation in some of the leading mills of the country.

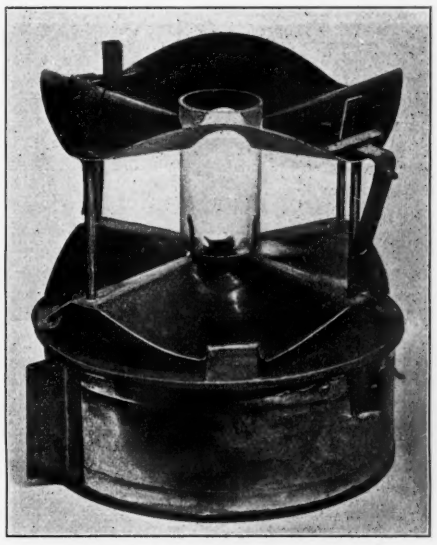
Further information may be obtained by addressing the manufacturers.

To reduce the number of different kinds of tickets, the Bavarian railroads are using one form from important stations to all other nearby stations to which the fare is the same. Thus, from Nuremberg the fare is 5 cents to 10 different stations. The names of all these stations are printed on a ticket, which is good to any one of them. This saves room in the ticket case, and perhaps a little time to the ticket seller.

The Dodson Switch and Signal Lamp.

The Atchison, Topeka & Santa Fe, the Delaware & Hudson, the Norfolk & Western and other roads are using the Dodson railroad switch lamp, designed to burn a long time and thus make possible a considerable saving in the cost of attendance. This lamp is made by the Dodson Signal Lamp & Lantern Co., of Scranton, Pa. It has an oil reservoir holding a large supply of oil, and the flame is so small that in seven days and nights continuous burning less than one quart of oil is used. A reflector of peculiar shape is used, so that the light is always sufficiently brilliant. Experiments have shown that the cost of oil per lamp per week is less than 2 cents. The manufacturers assert that lamps of the usual size will burn a full week, day and night, without filling, trimming or other attention; and some have been made which run ten days (240 hours) without attention.

The appearance of a lamp, taken out of the outer case or lantern, is shown in the accompanying engraving. It will be observed that the reflectors, above and below, although each made of a single piece of metal, are so shaped as to make four pairs of reflectors, each pair throwing the rays to one of the four sides of the lantern. The wick is round, about ¼ in. in diam., and is adjusted so that about ⅛ in. is exposed to the air. This makes a flame about ¾ in. high, which is made white by the draft through the short chimney. The wick is practically incombustible and does not have to be cut off more than once a month, though crust is brushed off every week. A pin, held by a spring, and easily withdrawn, holds the wick in position so that it cannot shake down when the lamp is jarred.



Dodson's Switch and Signal Lamp.

A marked feature of this lamp is the mechanical construction of all the parts, combining accurate fitting for service with loose fitting adjustments, which can be easily understood by inexperienced attendants. With the smallness of the flame, a conical cap over the tube and an air space between the oil and the flame, the lamp is kept cool at all times; and a perforated partition in the oil fount prevents agitation of the oil when the lamp is used on an engine or car. When used on trains a principal advantage of this lamp is in the saving of oil.

This lamp has been patented by Mr. W. R. Dodson, the inventor, and the rights are now owned by the Dodson Signal Lamp & Lantern Co.

Truck for 80,000-lb. Capacity Coal Car.

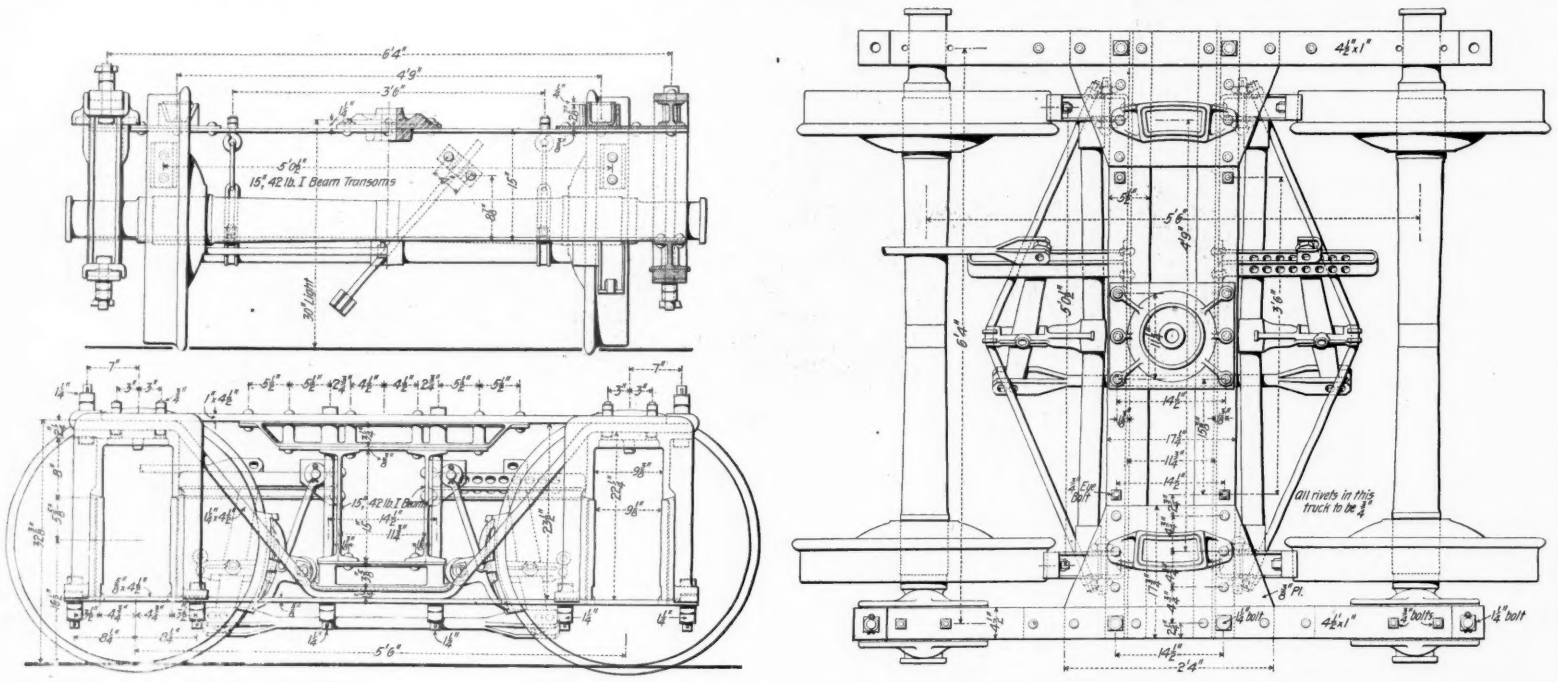
The 80,000-lb. capacity coal cars which the Pullman Car Company are building for the Mexican Central Railway will be equipped with the truck shown in the accompanying drawings. This truck is similar in design to the Mexican Central truck illustrated in the *Railroad Gazette* of June 4, 1897, strengthened and improved, however, for use under cars of 80,000-lbs. capacity instead of 60,000 lbs. In this new truck the pedestals are cast steel, both jaws and the top spring seat being in one piece. Cast-steel pedestals, somewhat similar in design, have been in use on the Mexican Central Railway for over a year, but this latest style is furnished with cast-iron shoes to prevent the excessive wear of the cast-iron boxes in contact with cast-steel pedestal jaws, and also to form an easy means of taking up such wear as must necessarily occur, by putting in new shoes. These shoes are held in place by the tie-bar, which has a hole to receive a lug on the shoe. The upper end is wedge-shaped and fits into a recess in the pedestal while the sides have lips. The upper part of the pedestal forms the top spring seat for a coil spring which is placed over the box, this having the lower spring seat cast on top of it.

The M. C. B. standard axle with 5 in. x 9 in. journal is used and the box is equipped with the Mexican Central universal journal bearing and wedge which has been in use on this road for about 18 years. The box, however, is the M. C. B. standard on the inside, and will, therefore, take the M. C. B. brass and wedge.

The transoms are 15-in. 42-lb. steel I beams, held rigid with the arch bars by gusset plates of ⅜ in. steel. In order to obtain the requisite height of these transoms above the rails, steel castings are placed both above and below them.

The center plate and side bearings are both cast steel, the former being riveted directly to the top flanges of the transoms and the latter placed on top of the gusset plates. These side bearings have cast-iron cups which are placed in the pockets formed by the side bearings, and thus permit the height to be adjusted by shims under the cups. These cups are also filled with oiled waste to lubricate the side-bearings.

National Hollow brake-beams and cast-iron shoes are used.



Truck for 80,000-lb. Capacity Car—Mexican Central Railway.

New Railroad Work in Arkansas.

Railroad building is advancing well in Arkansas. Last year 282 miles was added, and in 1898, 224 miles. Up to June 30, this year, 62 miles was completed. This is the largest mileage built since 1882 and 1883, when the new building was 486 and 245 miles respectively. Arkansas began her railroad building in 1858 with five miles, which was increased to 38 miles in 1860. After that there was nothing added until 1868 when 48 miles was built. During the following year 128 miles more was completed. There was 740 miles in the State in 1875, and 859 miles in 1880. Arkansas then had a boom in railroad building, reaching 1,792 miles in 1885. Since that year the figures have been 2,203 miles in 1890, 2,439 in 1895, and 2,823 at the end of 1898, the latest record of Poor's Manual. The mileage added in 1899 and so far in 1900 will bring the present figures above 3,150 miles. The smallest building in recent years was in 1892 when only 15 miles was finished. There was but 21 miles built in 1895. According to the latest report of the Interstate Commerce Commission, Arkansas, on June 30, 1898, had an average of 5.9 miles of railroad for each 100 square miles of territory and 23.51 miles for each 10,000 inhabitants. The similar figures for the neighboring state of Missouri were 9.93 miles and 21.61 miles respectively, indicating that the two states were served about equally as to population but that Missouri had the decided advantage as to territory.

Railroad building promises well in the State for the immediate future. Latest returns to the *Railroad Gazette* show that 14 companies, old and new, are now building over 200 miles of road within the state. About 25 companies more have plans for building more or less developed, involving more than 1,500 miles of new road. Of course, much of this projected road will never get beyond the paper stage. But out of the large number of plans a few are fairly sure of some realization.

A noticeable feature of the new building of Arkansas is the almost entire absence of the names of the older and larger companies. For the most part the building companies were formed at a comparatively recent date and their lines as yet have not been absorbed into the older companies. The Jonesboro, Lake City & Eastern was organized in May, 1897. Last year it was completed from Jonesboro, east 32 miles to Leachville. Jonesboro is on the Kansas City, Fort Scott & Memphis and the St. Louis Southwestern, and is near the northeast corner of the state. Work was begun early this year on an extension from Leachville east 25 miles across Big Lake to Blythesville, which is the present southern terminus of the St. Louis, Caruthersville & Memphis, another recently built line which extends northeast 28 miles across the state line to Caruthersville, Mo. This latter company has under consideration an extension from Blythesville south about 10 miles to Luxora, to connect with the Deckerville, Osceola & Northern, and so to Deckerville, on the Kansas City, Fort Scott & Memphis.

Under the title of the Northern Central a railroad is being built across the northern end of the state without any apparent connection with other railroad companies. It is projected from Winnerva, in Baxter County, west about 50 miles to Oregon in Boone County. Both terminals are small places and the line of survey crosses no other road. Right of way is secured for the entire 50 miles. The road is graded from Buffalo City to Yellville, 20 miles, and tracklaying was to be begun July 1. An extension to the east would connect with the St. Louis Southwestern or the Kansas City, Fort Scott & Memphis. An extension westward would reach the St. Louis & San Francisco. The St. Louis & North Arkansas, formerly the Eureka Springs, is building an extension which may be designed to serve this very purpose. This line extends from Seligman, on the St. Louis & San Francisco, just across the Missouri line, southeast 18½ miles to Eureka Springs, Ark. Grading is in progress on an extension from Eureka Springs east 40 miles to Harrison, which is only a short distance from Oregon, terminus of the Northern Central road.

The Pine Bluff & Western is a line recently completed from Pine Bluff, on the St. Louis, Iron Mountain & Southern and the St. Louis Southwestern, northeast 12 miles to Doylestown. Building is in progress to Sheridan, about 12 miles west. The Sawyer & Austin Lumber Co., of LaCrosse, Wis., are the builders. The road, so far, as completed, is being operated for freight only. Surveys have been made for a further extension to the Little Rock & Hot Springs Western. This latter company is successor to the Little Rock, Hot Springs & Texas, which got into financial difficulties after building only a part of its line. The company was reorganized last year and the line completed from Little Rock southwest 57 miles to Hot Springs. Some preliminary work has been done for an extension from Hot Springs west about 75 miles to Mena on the Kansas City Southern. It is probable that this line will be built. The company is building a branch three miles long from Bauxite into the bauxite fields.

The Elliott & Mt. Holly, which runs from Elliott on the St. Louis, Iron Mountain & Southern southwest 21 miles to Mt. Holly, is building a branch from Haynesville west 25 miles to Magnolia, on the Louisiana & Northwestern. It is completed to Dewey, only a short distance from Magnolia. An extension is proposed from Mt. Holly south about seven miles to Schuler on the Arkansas Southern. Another branch runs from Taylorville southeast six miles to Miles. It is proposed to extend this branch on about 15 miles southeast to Eldorado, another point on the Iron Mountain road. The Arkansas Northwestern is building a line from Hope southeast about 25 miles to Stamps. There connection will be made with the Louisiana & Arkansas for points in Louisiana. At Hope the road will connect with the Arkansas & Louisiana, which runs northwest 25 miles to Nashville. It is understood that the Arkansas Northwestern is to form a connecting link between the two companies. The North Arkansas & Western is a new line building from Fayetteville, on the St. Louis & San Francisco, southwest about 70 miles via Prairie Grove, Ark., and Stilwell, Ind. T., to Tahlequah. Nearly all the surveys are completed. Grading was completed as far as Prairie Grove, 10 miles, at last report and track laying was in progress.

Building is in progress on several lines in adjacent states which are booked to be extended into Arkansas. One of these is the Arkansas Western, which is to run from Hot Springs west 120 miles via Waldron, Ark., to Wister Junction, Ind. T., on the Kansas City Southern. Grading is in progress on the section from Wister Junction to Waldron, 36 miles. Tracklaying was to be begun July 15. After this section is finished the work is to be continued at once, according to report, on the section to Hot Springs. Houck's Missouri & Arkansas is building an extension from Moorehouse, Mo., south 42 miles to Kennett, near the Arkansas border. Surveys have been made for about 85 miles more of road south from Kennett to West Memphis, Ark., across the river from Memphis, Tenn.

The Gurdon & Fort Smith is projected from Gurdon on the Iron Mountain line, to run northwest about 125 miles to Fort Smith, on the western border of the state. Bids are being received for the first 35 miles from Gurdon which will take the road through Shawmut. The Missouri Pacific is reported interested in this line as forming a part of the connecting link between its western lines and the line south to Alexandria, La. The Mississippi River, Hamburg & Western has built 38 miles of road from Luna, on the Mississippi River, west to Hamburg. At Luna connection is made by boat with the Illinois Central, and the Southern Ry. at Greenville, Miss. An extension of about six miles may be built from Luna east, which will carry the terminus that much nearer Greenville. From Hamburg the road is projected west about 135 miles across the south end of the state to Texarkana.

Last year the White River, Lonoke & Western was completed from Wooley, on the Iron Mountain, southeast through Lonoke to Seaton. It is to be extended about 65 miles more southeast to White River on the Mississippi River. There connection could be made by boat with the Illinois Central at Rosedale, Miss. Thirteen miles of this extension is to be completed this year. The company also proposes a line from Lonoke to Thomblyn, 19 miles. The Pine Bluff Arkansas River, which runs from Rob Roy, on the St. Louis Southwestern, southeast 30 miles to English, has made surveys for an extension from English east eight miles to Big Bayou Meto. Near by is the Stuttgart & Arkansas River, extending from Gillett north 41 miles to Stuttgart, on the St. Louis Southwestern. The property has been sold to interests friendly to the Searcy & Des Arc, and it is proposed to build a connecting line from Stuttgart north about 35 miles to Des Arc, from which that company's line extends north 24 miles to Searcy. This will give about 100 miles of direct line. The Stuttgart is also considering an extension from Gillett, the southern end, to the Arkansas River, eight miles.

A new line is projected by the Gulf, Louisiana & Great Northern from Vermilion Bay, La., on the Gulf, north 270 miles to the Arkansas line and thence about 200 miles more to Ft. Smith. Some months ago it was reported that financial arrangements were completed for building the line and that work was to be begun at Pineville, La. A number of efforts have been made to connect Little Rock with Springfield, Mo. The Little Rock Northern proposes a line of 287 miles between the two cities. Locating surveys are in progress and it is stated that building will be begun soon. The Arkansas Northern was organized to build a similar line. The state made a land grant and the people of Little Rock offered $100,000. The company, however, was unable to begin work within the prescribed time and its charter was declared forfeited. The Arkansas & Missouri was incorporated last August by men interested in the Arkansas Northern to take up the work. The state of Arkansas has granted 1,000 acres per mile to the Dardanelle & Ola for a line from Dardanelle south 85 miles via Ola to Hot Springs.

TECHNICAL.

Manufacturing and Business.

F. M. Pease, Inc., Chicago, has sold five tank cars to the Cleveland Refining Co., and seven to the A. D. Miller's Sons Co., Allegheny, Pa.

The Bethlehem Steel Co. has appointed the Abner Doble Co., Fremont and Howard streets, San Francisco, Cal., agents for the Pacific Coast.

"Universal" bearings have been specified on the 1,000 cars ordered by the Missouri Pacific from the American Car & Foundry Co., and referred to last week.

The Richmond Locomotive & Machine Works have received orders for one locomotive boiler from the Cincinnati Northern and for six locomotive boilers from the Central Vermont.

The Wells Light Mfg. Co. (Edward Robinson, sole proprietor), New York city, has received an order from the Pennsylvania Railroad for a number of additional Wells lights. They will be used for equipping wrecking cars and for night construction work.

The Link Belt Engineering Co., of Nicetown, Pa., have opened an office at Pittsburgh, Nos. 1501 and 1502 Park Building, Mr. T. Frank Webster, Link-Belt Engineer, in charge. Mr. Webster will have the care of all business interests in that vicinity for the Company.

The Kinnear Mfg. Co., Columbus, Ohio, has recently furnished the Pan Handle R. R. with 60 steel rolling doors for the new freight house at Indianapolis, with 33 large steel rolling doors of their new freight house in Chicago. The Baltimore & Ohio R. R. with 80 for their new freight house in Baltimore, Md., and has equipped the new roundhouses at Walbridge Ohio, and Columbus, Ohio, of the Hocking Valley R. R.

The Powers Regulator Co., of Chicago, Ill., are meeting with considerable success in the introduction of their automatic temperature regulator. The Chicago, Milwaukee & St. Paul experimented with it last winter, and are now equipping their Pioneer Limited trains with it complete. The New York Central & Hudson River R. R. are completing the equipment of the Empire States Express with it. Mr. Charles F. Pierce, who has been the Eastern representative of the Powers Regulator Co., will now make his headquarters in Chicago.

In a recent issue of *Graphite* appears a note concerning the painting of the roof of the trainshed and waiting room at the Pennsylvania terminal in Jersey City. The waiting room, it will be remembered, was some months ago destroyed by fire. The tin roof of that part of the structure had been painted with Dixon's silica graphite paint for more than three years and was in good condition. The ferry sheds, which are still standing, and their tin roofs, have now been protected from corrosion for five years and have not required repainting notwithstanding the heat from the fire and the corroding action of the salt air. Furthermore, it is said that this paint never fades, thus insuring the permanence of the architectural effect.

Iron and Steel.

Clyde shipbuilders are reported to have placed orders for 150,000 tons of ship material in the United States.

Bids are asked by the Dutch Minister for the Colonies, at Amsterdam, Holland, for the furnishing of metal articles for railroads and collieries. The Government proposes to spend about $4,000,000 in improving the railroads, water works, etc., in Java and the other Dutch colonies in Malaysia. G. B. F. H. Alpherts, Director of the Technical Bureau, Netherlands Colonial Office, at The Hague, and C. W. Weys, Engineer of the Water Works, Java (who was recently stopping at the Hotel Duquesne, at Pittsburgh, Pa.), will have charge of placing the contracts.

Boiler Explosion in England.

On Sept. 25 the boiler of freight engine No. 522, of the Great Eastern Railway, exploded while standing at Westerfield station. The results of this explosion, and also the circumstances which attended it, were somewhat out of the ordinary. The locomotive was comparatively new, having been in service about one year, and repairs to staybolts had been made but two days before the explosion. The failure was in the fire-box and the engineer and fireman were killed. At the inquest, held at Ipswich, Oct. 1, the evidence of a consulting engineer of the Board of Trade set forth that the left side of the fire-box was completely torn away, the boiler head and door sheet partially torn away, the crown sheet torn across the top, and that there was a large rent down the right side of the fire-box. A witness found that a dozen or two of stay-bolts had defective thread and he concluded that defective stays in the side sheets had caused the explosion. Copper stay-bolts and side sheets were used. It is stated that there was evidence of bulges in the side sheets previous to the explosion, and also that the stay-bolts had been leaking. An agent of one of the insurance companies asserted that it was a case of low water, but the uninjured condition of the flues seemed to disprove this. The sense of the verdict of the coroner's jury was that the engine crew had come to their death by the explosion of a locomotive boiler which was, and had been for some time, in very defective condition; that, from the evidence, considerable laxity had existed in the past as to individual responsibility for repairs and maintenance; that much more supervision should be exercised in the repairing of engines and boilers, and that, instead of leaving the work entirely to the individual boiler maker who had it in hand, each engine before leaving the yard should be examined and tested by some experienced employee of the company. The consulting engineer expressed a preference for bronze stay-bolts in the fire-box, the locomotive superintendent agreeing with this preference. This explosion is spoken of by the English technical press as being unique in that it is the only instance on record within their knowledge where a locomotive boiler has exploded within a year of the time it was built. The tone of criticism we have seen from this source commends general practice, viewing this single occurrence as an exception to the rule. Unduly soft copper is thought by some critics to have caused the explosion.

Oil Fuel in California.

The quantity of oil used for locomotive fuel on the San Francisco & San Joaquin Valley road in October averaged 677 barrels a day, and on the Southern California 843 barrels a day. Large tanks are being built at division terminals on these and other Atchison lines, to hold from 6,000 to 36,000 barrels of oil each.

Sewerage and Paving Contracts in Havana.

Bids will be wanted in a short time on the contract for the sewerage and paving of Havana, which will cost about $8,000,000. The plans for the work were made under the direction of Major Wm. M. Black, now Chief Engineer of the Division of Cuba. Plans were drawn by D. D. McComb, and revised by S. M. Gray.

Interlocking at the Grand Central Station.

The low-pressure pneumatic interlocking apparatus made by the Standard Railroad Signal Co., which has been in course of erection at the Grand Central Station, New York, for several weeks, is now so far completed that half of the switches and signals are in operation. The western half of the yard, including the outward tracks, was put in service with the new machine at six o'clock on the morning of Sunday, Oct. 28, and all the parts have worked with entire satisfaction. The reports show that there has not been the slightest delay to trains.

THE SCRAP HEAP.

Notes.

Canadian papers report that on the western end of the Canadian Pacific an extensive conspiracy to steal and resell tickets has been discovered by the Canadian Pacific, a number of conductors and ticket agents being implicated.

On the suburban trains of the Illinois Central running into Chicago passengers can now have their shoes polished, the railroad company having employed a large number of boys to work regularly on the trains. The boys are uniformed and they each have a cash register.

Milwaukee papers report that the Chicago, Milwaukee & St. Paul has made an increase of 15 cents per 100 miles in the pay of enginemen running the largest size engines, both passenger and freight; also an increase of 10 cents to firemen. Runners of switching engines, whose pay is $1.90 a day, have their hours reduced from 11 to 10.

The number of cars moved over the Middle Division of the Pennsylvania Railroad during October, measured by the number passing Lewistown Junction, was 183,826. This is an increase of 21 per cent. over the preceding month and 20 per cent. over the month of October, 1899. The total is 8,718 larger than the number moved in March, 1900.

The Railroad Commissioners of Minnesota have refused to accept the annual report sent in by the Great Northern Railway. Minnesota requires that the earnings in that state be reported for all traffic carried and such reports have, we believe, been made in former years, each company dividing the revenue on interstate shipments on such basis as to it seems best; but the Great Northern now informs the Commissioners that as the apportionment of the revenue between two or more different states cannot be accurately made, and therefore is misleading, the company has decided to no longer make such apportionment.

Traffic Notes.

A carload of ore recently received at El Paso, Tex., from the Delonos mine in Mexico was sold for $24,140.

The grain exporters at New Orleans have induced the railroads terminating in that city to extend, from 15 days to 20, the free time on cars containing export freight to be unloaded.

Press despatches say that both the Northern Pacific and the Great Northern are now bringing wheat from Washington to Minneapolis and Duluth. The rate is said to be 60 cents per 100 lbs.

The latest passenger advertisement is a cook book. It contains recipes in use on the dining cars of the road issuing the advertisement. The originator of this novelty is the General Passenger Agent of the Big Four.

According to the *Washington Post* the Department of the Interior saved $40,000 during the last fiscal year, on the transportation of freight to Indian reservations, by dealing directly with the railroads instead of through contractors. It is said that this sum equals 20 per cent. of the total amount formerly paid.

The newspapers say that General Passenger Agent E. A. Ford, of the Pennsylvania lines West of Pittsburg, has been making extensive inquiries as to the preferences of passengers concerning the basis on which meals should be paid for in dining cars, and that as a result he has decided that the flat rate of $1 a meal is most satisfactory.

The Pass Forgers.

Mr. Donald, Commissioner of the Central Passenger Association, has issued a circular giving a list of the things found in the possession of the two men who tried to get a counterfeit rubber stamp made in that city and who were arrested on October 26. The men gave their names as Meiers and Jones, respectively, and they were arrested on information given to Mr. Donald by A. W. Martin & Co. The list of steel dies, wood cuts, rubber stamps, autographic stencils, blank employees' passes, employees' passes filled out, blank envelopes and letter heads of 20 different roads, and genuine trip passes (which had been secured for a number of 500-mile and 1,000-mile trips), fills two pages of the circular. A press despatch from Chicago says that the two men were indicted by the Grand Jury on Monday.

France as a Coal Market.

The price of coal in Rouen is about $11 and $13 per ton of 2,240 pounds, according to quality, and if present conditions continue it may reach $14 or $15 a ton in a few weeks. This is not a local rise caused by the dealers; the explanation is to be found in the interruption of the foreign supply, which exists all over France. One of the most important railroad lines will soon augment its almost exhausted supply with trans-Atlantic coal. The opinion from authentic sources is that France will this year be short not less than 10,000,000 tons. France annually consumes 42,000,000 tons of coal; she produces only 32,000,000 tons. In former years, the deficit has been made good by other countries, principally Great Britain, and to some extent by Germany and Belgium. All three of these countries, however, now require more than their own output. If there ever was a time for American coal to compete with European it is now, and France offers an exceptional opportunity for American exporters. Circulars printed in English are a waste of time and money. What does a man who thinks in French know about "volatile matters" or "fixed carbon" or "ash?" A ton of 2,240 pounds is as indefinite to a Frenchman as the word "some" is to an American. Quotations, to receive attention, must be put in French weights and money and in the French language.

The Pittsburgh Valve, Foundry & Construction Co.

A charter was issued October 26 to the Pittsburgh Valve, Foundry & Construction Co., with a capital of $1,150,000. The company is made up of the following concerns: Atwood & McCaffrey, Pittsburgh Valve & Construction Co., the pipe fitting department of the Wilson-Snyder Mfg. Co., the Shook-Anderson Mfg. Co., and the foundry department of Alexander Speer & Sons. The company proposes to build a three-story building 60 ft. square, at Fifth street and Duquesne Way. The temporary officers are: Henry M. Atwood, President; Joseph T. Speer, Vice-President; Moses Atwood, Secretary; C. A. Anderson, Treasurer, and George E. Klingelhofer, General Manager.

Improvements on the Baltimore & Ohio.

In our brief analysis of the annual report of the Baltimore & Ohio mention is made of the heavy expenditures for improvements and betterments. One important class of improvements is the reduction of grades. This has been begun, together with changes of line, between Relay and Frederick Junction, Md., to reduce the grades between Baltimore and Brunswick to 16 ft. to the mile and will lower the helper grade at Mt. Airy so that one helping engine will take over the trainload for the through grade of 16 ft. On the line between Glenwood and Wheeling grade reduction is going on, necessitating some tunnels. Between Bellaire and Newark, O., between Newark and Sandusky, between Chicago Junction, O., and South Chicago, grade reductions are also going on, and between Chicago Junction and South Chicago a new double-track bridge is being built over the Calumet River, and the grades between those points will be reduced to 16 ft. westward and 19 ft. eastward, and there will be 111 miles of double track. Among other improvements going on is the building of 58 miles of siding, also the building of new and strengthening of old bridges on many parts of the line and the building of new shops and additional equipment of old ones.

Contract for the Guatemala Northern.

The contract for extending the Guatemala Northern is between the Government and Snyder, Barthel & Co. This is the improvement recently referred to as being proposed by the Central American Improvement Co., of New Orleans, La. (Oct. 5, p. 659), of which Minor C. Keith is President and Richard Barthel Secretary and Treasurer. Under the contract the American Co. is to control and operate the railroad for 10 years, to put it in first-class condition and to extend the line to Guatemala City and the Pacific Coast. Building must be begun by Dec. 1 next and completed by Dec. 31, 1902. Guatemala grants a subsidy of 200,000 acres of land and gold bonds for $4,000,000 at 5 per cent., to run 10 years. The company has announced its intention, according to report, to run a steamship line from Puerto Barrios, the Atlantic terminus, to New Orleans as soon as the Trans-Isthmian line is completed, if not before.

Railroad Concessions in Nicaragua.

The Nicaraguan Government has temporarily abandoned the building of the railroad from San Ubaldo, on Lake Nicaragua, to Rama, near Bluefields, on the Rama River (April 27, p. 276). The proposition is to build a line from Managua to La Paz, about 37 miles, thus connecting two divisions of the present Government railroad system and obviating the present costly system of transfers of steamer across Lake Managua.

The Government has granted a concession to a Mr.

Freeman, of New York, according to the American Consul at San Juan del Norte, to build a railroad from the Wawa River on the Atlantic coast, in the old Mosquito Reservation, to Matagalpa, and to connect with the National System at La Paz or some other convenient point. A deposit of $50,000 gold must be made by the contractor within six months from September, 1900, and work must be begun within one year and the entire line completed within four years thereafter. The contractor is obliged also to dredge or make a harbor or channel at Wawa River, to establish a wharf and run steamers on the coast with New Orleans connections.

Lake Borgne Canal Contracts.

Contracts have been made with the Illinois Steel Co. for four large steel lock gates, to be delivered and put in place within three months in the Lake Borgne canal. Chairman M. J. Sanders, of the Board of Directors of the Lake Borgne Canal Co., is reported as stating that the canal will be open to traffic on February 1, 1901. Contracts have also been let for the levee work. The canal will connect Lake Borgne with the Mississippi River at New Orleans.

Rolling Stock Wanted in Chili.

A bill has passed the Chilian Senate placing at the disposal of the President of the Republic a fund of 2,500,000 pesos for the purchase of rolling stock for the state railroads of 1 meter standard as well as those of 1.78 meters.

River and Harbor Improvements.

General John H. Wilson, Chief of Engineers, U. S. A., in his annual report asks for $25,117,800 for river and harbor works, and for $5,765,000 for coast fortifications. Last year the expenditures for rivers and harbors amounted to $18,485,298 and for fortifications $2,000,000. The estimates for work near Pittsburgh include: Ohio river, for work during the coming year, $400,000; balance available, $367,641.11; movable dams on the Ohio river, for work during the coming year, $525,000, in addition to the balance; Monongahela river, in West Virginia, balance available, $679,152.38; estimate for completion, $350,000; Monongahela in Pennsylvania, balance available, $169,809.84.

For improvements in the Connecticut River below Hartford, Conn., the General recommends $10,000 to continue the work.

New York Navy Yard Dry Dock.

The Navy Department has decided to locate the new million-dollar dry dock at the Brooklyn Navy Yard between docks 1 and 2, as recommended by a majority of the board appointed to select a site for it. The minority reported in favor of the old cob dock.

Harbor Works at Rosario, Argentine.

The new harbor works at Rosario, Argentina, are to be let next spring. Bids must be sent to the Argentine Legation in London not later than April 10, 1901, or to the Minister of Public Works at Buenos Ayres not later than May 10, 1901. Plans of the work may be examined at the Commercial Department of the Foreign Office in London. E. L. Corthell, Civil Engineer, of 27 Pine street, New York, and care of Eddy, Hall & Co., No. 399 Reconquista street, Buenos Ayres, is the Chief Engineer.

Locomotive Building in Scotland.

The locomotive industry in the West of Scotland has been in a most satisfactory position for some time past, but this notwithstanding, it is pleasant to be able to report a further consignment of orders coming to Glasgow. Three of the most important locomotive building concerns in the city, Messrs. Dübs & Co., Neilson, Reid & Co., and Sharp, Stewart & Co., have received orders which will keep them busy for a good many months to come. The Hyde Park firm have booked an order for 60 goods engines and tenders from the Midland Railway Company, as well as one for 40 goods engines and tenders for the Great Central Railway Company, while Messrs. Sharp, Stewart & Co. have been commissioned by the first-named company to build 20 locomotives to their order. On the other side of the river Messrs. Dübs & Co. have had an order for 60 engines and tenders placed with them by the Natal Government. Several other local firms are negotiating for extensive orders which are to be placed shortly, as the war has wrought havoc with the rolling stock of the railways in the affected districts. These orders, it is stated, are part of a batch of 300 engines which had been expected by local firms for some time past. The only drawback to this local locomotive boom is the fact that there are so many orders in hand that speedy delivery cannot be assured, and it is feared that this state of matters will result in the important Colonial orders still under consideration being forced elsewhere.—*Transport.*

The Pushful Yankee.

A very significant example of the keenness of the pushful Yankee has been afforded by the arrival of heavy consignments of steel plates and angles in Glasgow during the past few days. The steamer "Cranfield" has arrived from Philadelphia with 2,000 tons of steel scrap, 530 tons of steel rounds, 130 tons of angles and tees, and 14 tons of flats, while the Anchor liner "Ethiopia," on arriving on Thursday from New York, had 460 tons of billets and slabs on board. Most of these consignments were booked by local shipbuilders. The statement has been freely made in shipbuilding circles that but for the importation of this material from America the builders would, in a great many cases, have been unable to execute the orders booked by them without a vast deal of inconvenience and delay.—*Transport.*

South African Railroad.

According to a report of a speech recently delivered by Sir Albert Hime, Prime Minister for Natal, there seems to be a prospect of the long-talked-of line to join the Natal and Cape Colony systems being taken seriously in hand. It appears that both Sir Albert Hime and Sir Gordon Sprigg, Premier of the Cape, are strongly in favor of this connection between the colonies, and the Governments have agreed that the point of junction shall be Riverside. In the same speech the Natal Premier reported satisfactory progress with harbor extensions at Durban. The depth of water alongside the quay has been increased, and a large and handsome esplanade has been constructed skirting the bay. Vessels of 10,200 tons can now enter the port, and discharge at the wharves. Both the railroad and harbor authorities of Natal have received the highest possible praise from the military and naval commanders for their conduct of the traffic connected with the war.

Iron and Steel in the United States.

The Bureau of Statistics of the Treasury Department has published a pamphlet on the Iron and Steel Trade of the United States, showing resources, development and relations to the home and the world markets. The great producing nations are the United States, Great Britain and Germany and the table below gives the quantities of iron ore and of coal produced in 1899 by these three countries. It gives also the percentage which their product is of the world's product.

	—Iron Ore—		—Coal and Lignite—	
Country.	Tons.	Per Cent.	Tons.	Per Cent.
United States (estim'd)	25,000,000	29.74	230,838,973	31.96
Great Britain	14,176,938	16.86	220,085,303	30.47
Germany and Luxemb'g	17,989,665	21.40	135,824,427	18.81

Great Britain besides producing something over 14,000,000 tons of ore imports a good deal; that is, Spain in 1899 produced 9¼ million tons of ore and only 2¾ million tons of coal. It follows naturally that much of the Spanish ore production is exported, and England probably consumes half of the output of Spanish ore. The total consumption of ore in Great Britain is about 20,000,000 tons, while in the United States it is a trifle more than the domestic production. The United States, in addition to the domestic production of say 25.000,000 tons imported in 1899, 674,000 tons, nearly all of this having come in through the ports of Baltimore and Philadelphia, a large part of it of course being from Cuba. Germany imports a small quantity of ore, but exports about the same amount, the consumption being just about the same as the domestic product.

"Discipline by Record."

A local paper reports the result of the administration of Brown's discipline on a division of the Wabash road for the month of October as follows:

"Demerit marks have been assessed against five conductors, five brakemen, four switchmen, two clerks, one towerman, two agents, eight engineers and six firemen. Conductor McGeeny has been given ten credit marks for notifying a passenger train of lost brake shoe. Brakeman Fletcher has been given five credit marks for good judgment in stopping a train and preventing an accident. Brakeman Hover 15 credit marks for the same. Engineer Null 10 for extinguishing a fire at a bridge. Engineers Butler and Cahill 10 each for good service. Fireman Seroczynski five for good judgment in preventing delay to a passenger train. A number of employees are given credit marks on account of six months clear record."

Rolling Stock for New Zealand.

The colonial government has recently placed with a United States firm an order for sixty-odd passenger coaches at a cost of about $500,000, to be built under the supervision of a railroad officer, who is now en route to the United States. The placing of this order has caused much adverse criticism among the labor parties, but the government does not appear to be greatly perturbed. The order calls for specially designed coaches for the narrow gage throughout the colony, and they will be of the latest and most modern pattern, including every up-to-date improvement known to American car builders. It is expected that these coaches will be shipped from New York City in March, 1901. Mr. Ward, the Minister for Railroads, while in the United States last year, carefully studied our railroads, coaches, locomotives, and management.

Auckland, Sept. 12.

Egypt's Importation of Rolling Stock in 1899.

During the year 1899 Egypt imported 104 locomotives valued at $704,340, or an average of $6,768 per engine. Most of the locomotives came from Belgium (39) and Great Britain (36). The other countries of origin were: the United States, 22; Germany, 6; France, 1. The imports of passenger and freight cars amounted in value to $1,075,200; the great bulk came from Belgium, some quantities from Great Britain, and small lots from Germany. In iron and steel, too, Belgium's trade with Egypt is steadily and considerably increasing, whilst the imports from Great Britain are falling off almost in the same ratio.

Shipbuilding in Germany.

Consul Winter reports that "during the past ten years, shipbuilding in Germany has become a great industry. The present capacity of all the yards does not meet the demands of the German merchant marine, and many orders must still be placed in foreign countries. At present, 22 ships are being built in England for Hamburg alone. During the first half of the present year, the dock owners and shipbuilders of Stettin, Kiel, Flensburg, and Bremen have increased their capital stock, on the whole, by $1,378,000. Many new enterprises are being planned. In the neighborhood of Nordenham, on the Lower Wesel, large docks are being projected. A dock for Stralsund is being planned which will cost nearly $1,000,000. It is also reported that a German-Belgian syndicate will build a dock in Antwerp under the auspices of the Bremen Vulcan Works. The German merchant marine now numbers 1,209 steamers, of 2,159,919 tons."

Technical Schools.

Purdue University.—Mr. W. H. Marshall, Superintendent of Motive Power and Machinery of Lake Shore & Michigan Southern, lectured Thursday afternoon, Nov. 1, on "Problems in the Motive Power Department."

University of Michigan.—It seems that only one woman has been a student in the engineering department of the University of Michigan. She was enrolled during the year of 1897 and 1898. We have recently mentioned the course in naval architecture and marine engineering established; there are 10 new courses now, seven in naval architecture and three in marine engineering, all under the engineering department. Five of these are given each semester. An 8 k.-w. rotary converter has been added to the equipment of the electrical laboratory.

Liquid Fuel in Steamers.

The steamship "Cowrie" of the Shell Transport & Trading Company, managed by Sir Marcus Samuel & Co., which is now discharging a cargo of oil in the Thames, has steamed all the way from Koetei, in Borneo, to London—9,250 miles—using nothing but liquid fuel; and the boilers for supplying the steam for the pumps now discharging the cargo are fired by the same material. The oil is reduced to spray by means of a steam jet at the furnace door, where it is delivered from furnace tanks above the boilers. The "Cowrie" was formerly fired with coal, and her conversion to liquid fuel has been attended with advantageous results. Her complement of stokers has been reduced to six, as against 16 necessary with coal, and her speed has at the same time been slightly improved. Moreover, the change has effected an important saving in bunker space, for her consumption of oil on this voyage was only 22 tons a day, whereas her daily consumption of coal used to be 35 tons, and a ton of oil is calculated to occupy only 34 cu. ft., against 45 ft. required for coal. Oil, too, can be carried in the water ballast tanks, and can also be taken on board much more quickly than coal—on a recent occasion 300 tons were pumped into a German steamer in one hour. The oil yielded by the Borneo fields is said to be superseding both the Russian and the American products in the Far East, where it is extensively used for fuel in steamers—*e. g.*, the Hamburg-American boats engaged in the Eastern trade. According to the terms of a recent contract it is to be delivered at the price of 30s a ton at Singapore and Hong Kong, 32s 6d ($7.90) at Shanghai, 35s ($8.51) in Japan and Colombo, and 50s. ($12.16) at Suez. The "Cowrie" brought from Borneo over 6,000 tons of solar oil, the greater part of which is destined to be used by the Gas Light & Coke Company for the production of oil gas for enrichment purposes, and it is an interesting fact that the vessel (or one like her) will be bunkered with the refuse that remains after the oil has been utilized in this manner.—*London Times.*

Increasing the Efficiency of Steam Engines.

Prof. E. Josse, of the Royal Technical High School, Charlottenburg, has made experiments on a steam engine with which is combined an auxiliary engine utilizing the heat contained in the exhaust steam; the invention of G. Behrend and Zimmerman. The heat contained in the waste steam is used to evaporate a liquid having a lower boiling-point than water, a solution of sulphurous acid having been chosen after many experiments; it is said to be cheap, and to lubricate the inner working surfaces of the machinery without corroding them. The steam engine has a stroke of 20 in., and a speed of 41 r.p.m. From the low-pressure cylinder the exhaust steam passes into a surface condenser in which the cooling medium is sulphurous acid. This is immediately decomposed by the heat of the exhaust steam, sulphur dioxide gas is liberated and passes over into the cylinder of the auxiliary engine. This auxiliary engine has a cylinder 12 in. diam., stroke 20 in., r.p.m. 77. After passing through the cylinder the sulphur dioxide vapor enters a surface condenser where it is condensed to liquid by cold water flowing around the tubes as in an ordinary steam plant. The steam engine developed 34 i.h.p. with a steam consumption of 18.96 lbs. per i.h.p. hour. The auxiliary engine indicated 19 h.p.; reducing the steam consumption to 12.13 lbs. per i.h.p. hour.

An Industrious Industrial Agent.

The latest advertising scheme is credited to General Passenger Agent W. J. Black, of the Atchison, Topeka & Santa Fe. Beginning in Oklahoma, he sent out one of his traveling men (an expert stenographer) last summer to visit individual farmers in their homes, find out what success had been met with since coming to the Territory, and then write letters at their dictation, addressed to Eastern friends, telling all about the big crops and resultant good times. This private secretary goes about with a team and carries along a small typewriting machine and stationery. He interviews the owner or renter of each quarter section on his route and writes down the industrial situation as it really is in that neighborhood. He tells just what luck was had with wheat, cotton, cattle and hogs, describes climatic conditions, mentions Mary and the baby, and sometimes winds up with the story of a lifted mortgage and money in the bank. This personal correspondence is followed up at the head offices of the road by mailing appropriate advertising literature to the Oklahoma "boomer's" friends. Beneficial results are said to be already manifest. When a person living back in Ohio receives a letter from his former neighbor written on a typewriter, he naturally concludes that any country which is prosperous enough to warrant a plain farmer owning his own writing machine is worth investigation. —*Exchange.*

LOCOMOTIVE BUILDING.

The Georgia Railroad is having two engines built by the Baldwin Locomotive Works.

The Georgia Southern & Florida is having three engines built by the Schenectady Locomotive Works.

The Butte, Anaconda & Pacific is having one engine built by the Schenectady Locomotive Works.

The Kentucky & Indiana Bridge & Railroad Co. is having five engines built by the Cooke Locomotive & Machine Co.

The Boston & Maine has ordered the 10 consolidation engines referred to last week from the Schenectady Locomotive Works.

The Delaware, Lackawanna & Western orders, referred to last week, call for 52 engines in all. Of these 10 consolidation and 14 switching engines were ordered from the Dickson Locomotive Works and eight passenger and 20 consolidation engines from the Schenectady Locomotive Works. The six switchers referred to Oct. 5 are a part of the 14 placed with the Dickson Locomotive Works.

The Colorado Midland, as stated Oct. 19, has ordered five compound consolidation engines from the Baldwin Locomotive Works to be delivered in February. They will weigh 180,000 lbs., with 160,000 lbs. on the driving wheels and have 17-in. and 28-in. x 30-in. cylinders; 60-in. driving wheels; boilers, with a working steam pressure of 200 lbs., and 337 tubes 2 in. in diam. and 14 ft. long; fire-boxes, 120 in. long and 42 in. wide; and a tender capacity for 6.000 gals. of water and 15 tons of coal. The special equipment will include Westinghouse air-brakes, Sterlingworth brake-beams, Monitor injectors, Nathan lubricators and Standard wheels.

The Oregon Short Line order with the Baldwin Locomotive Works calls for 15 compound consolidation and eight compound mogul engines for January and March delivery. The moguls will weigh 160,000 lbs., with 140,000 lbs. on the driving wheels, and have 15½-in. and 26-in. x 28-in. cylinders; 57-in. driving wheels; extended wagon top boilers with a working steam pressure of 200 lbs. and 340 tubes 2 in. in diam.; fire-boxes, 113 in. long and 40 in. wide; and a tender capacity for 6,000 gals. of water and nine tons of coal. The consolidation engines will weigh 198,000 lbs. with 168,000 lbs. on the driving wheels, and have 55-in. driving wheels; boilers with 385 tubes, 2 in. in diam.; and fire-boxes, 123 in. long. The other dimensions are the same as for the moguls. The specifications call for Little Giant bell ringers, Kewanee brake-beams, Buckeye couplers, Nathan injectors, Jerome piston and valve rod packings, Coale muffled safety valves, Leach sanding devices, Nathan lubricators and French springs. The engines are a part of the Union Pacific order referred to Oct. 19.

CAR BUILDING.

The Atlantic Coast Line will order 300 freight cars.

The St. Louis Southwestern is asking bids on 1,000 freight cars.

The Chicago & Eastern Illinois is about to order two baggage cars.

The Plant System is having two passenger cars built by the Pullman Co.

The Mexican R. R. is having three passenger cars built by Jackson & Sharp.

The Pennsylvania Lines West of Pittsburgh are asking bids on 1,000 flat cars.

The Great Northern, it is rumored, has ordered 1,000 cars from Haskell & Barker.

The Illinois Terminal has ordered 50 coal cars from the American Car & Foundry Co.

The Cleveland, Cincinnati, Chicago & St. Louis is asking bids on 12 passenger cars.

The American Car & Foundry Co. is building 10 tank cars for an operating company.

Clinch & Co. are having 25 freight cars built by the Illinois Car & Equipment Co.

The Atchison, Topeka & Santa Fe will increase its order for coal cars by 500 or 600.

The Illinois Central has ordered 500 sand cars from the Illinois Car & Equipment Co.

The Kansas City, Fort Scott & Memphis will buy eight passenger cars after the first of the year.

The Wabash has placed an order with the American Car & Foundry Co. for two passenger cars.

The Duluth, South Shore & Atlantic has ordered from the American Car & Foundry Co. 100 flat cars.

The Missouri, Kansas & Texas has been reported in the market for cars. This report is officially denied.

The Chesapeake & Ohio has placed an order for 15 box cars with the American Car & Foundry Co.

The American Refrigerator & Transportation Co. has ordered 200 refrigerator cars from the American Car & Foundry Co.

The National Rolling Stock Co. is having 200 freight cars built at the Milton works of the American Car & Foundry Co.

The St. Louis & San Francisco has ordered from the American Car & Foundry Co. 25 furniture, 50 box and 200 coal cars.

The Chicago & Eastern Illinois is asking bids on from 500 to 1,000 coal cars, on from 2,000 to 5,000 box cars, and on 20 passenger cars.

The Louisville, Henderson & St. Louis is having 10 passenger and 10 freight cars built at the Jeffersonville works of the American Car & Foundry Co.

The Burlington, Cedar Rapids & Northern has not, as reported, recently ordered new passenger equipment. It is receiving some coaches contracted for early in the year.

The Pennsylvania has ordered 500 coal cars from the Pullman Co., 500 box cars from the Illinois Car & Equipment Co., and 700 box and stock cars from Barney & Smith.

The Cincinnati, Hamilton & Dayton has ordered 200 box cars from the American Car & Foundry Co., with an option on 200 additional, and 200 coal cars from Barney & Smith, with an option on 200 additional.

The Intercolonial has placed the following orders for cars: Rhodes, Curry & Co., Amherst, N. S., 1,000 box cars; the Crossen Co., Cobourg, Ont., 200 box and 150 flat cars, and the Rathbun Co., Deseronto, Ont., 75 box cars.

The Norfolk & Western will build at its own shops a number of coal cars of 100,000 lbs. capacity. They will weigh 37,500 lbs., measure 33 ft. long over end sills, 9 ft. 3 in. wide and 10 ft. high and have steel underframes, with hoppers of wood. The special equipment will include Westinghouse brakes, Chicago couplers, cast-iron journal boxes with pressed steel lids and N. & W. standard bolsters, brake-beams and trucks.

The New York, New Haven & Hartford orders for 400 coal cars with the American Car & Foundry Co. (referred to Oct. 19) and 100 cars of the same class from the Keith Mfg. Co. (referred to Nov. 2) call for delivery in December. They will be of 60,000 lbs. capacity and measure 36 ft. over end sills (34 ft. inside), 8 ft. wide over side sills (7 ft. 8½ in. inside) and 4 ft. high and will be equipped with pressed steel bolsters and trucks, Kewanee brake-beams, Westinghouse brakes, Tower couplers and Thornburgh draft rigging.

The Pressed Steel Car Co. has in hand an order for 167 cars for use in South Africa by several of the large gold mining companies for carrying coal from the coal mines to the gold mines. They will be of 60,000 lbs. capacity, 3 ft. 6 in. gage, 30 ft. ¼ in. long inside, 7 ft. 3 in. wide inside, 9 ft. 8 in. high from top of rail to top of side, and 31 ft. 6 in. long over end sills. They will be equipped with automatic vacuum brakes, steel-tired wheels with wrought iron spoke centers and steel axles and Pressed Steel Car Co.'s standard truck frames.

The Erie order with the Presssed Steel Car Co. for 1,000 wooden box cars with metal underframes, referred to recently, calls for December delivery. The cars will have a capacity for 70,000 lbs., weigh 32,000 lbs. and measure 34 ft. 3¼ in. long inside, 8 ft. 2 in. wide and 7 ft. 10 in. high. The specifications call for Pressed Steel brake-beams. Westinghouse brakes, Magnus brasses, American couplers, Dayton door fastenings, with Q & C hangers, Pressed Steel draft rigging, Prince metallic brown paint, Chicago-Winslow roofs and Fox trucks.

The Missouri Pacific, as noted last week, has placed an order with the American Car & Foundry Co. for 1,000 coal cars of 60,000 lbs. capacity. Delivery is to commence within 30 days and to continue at the rate of 30 cars a day. They will be 35 ft. 7 in. long, 8 ft. 5¼ in. wide and will be equipped with Shickle, Harrison & Howard cast-steel body bolsters and Player trucks, Interchangeable brake-beams, Westinghouse brakes, Universal bearings, American Continuous draft gear, McCord journal boxes and lids, Patterson-Sargent paint and Pickering springs.

BRIDGE BUILDING.

AKRON, OHIO.—The Baltimore & Ohio has submitted plans to the Board of City Commissioners for a steel bridge across North Howard street.

ALLENTOWN, PA.—The Council is considering the ordinance relative to the bridge proposed from South Eighth street, Allentown, to South Allentown, and which is estimated to cost about $60,000.

ASHLAND, PA.—Surveys are being made by the Schuylkill Traction Co. for a new branch between Fountain Springs and Ashland, which will require a bridge about 1,000 ft. long.

BENWOOD, W. VA.—The Beilaire, Benwood & Wheeling Bridge Co. has been incorporated to build a bridge over the Ohio River between Benwood, W. Va., and Bellaire, Ohio, for the Uniontown, Wheeling & Waynesburg R. R.

BILLINGS, MONT.—Bids are wanted, until Dec. 3, for a bridge across the Yellowstone River near Billings. N. G. Carwile, County Clerk.

BUFFALO, N. Y.—The Board of Aldermen has approved the report of the Committee on Streets recommending a petition to the Legislature to abolish all the crossings at grade along the New York Central tracks in Buffalo.

CATASAUQUA, PA.—The County Commissioners are considering granting permission to the Catasauqua Bridge & Terminal Ry. to build a bridge over the Lehigh River at this place. W. L. Sims is General Manager. (Oct. 5, p. 660.)

CHICAGO, ILL.—The lowest bid for the substructure of the Clybourn place bridge was $65,000, by Fitzsimons & Connell Co.

CHIPPEWA FALLS, WIS.—Reports state that the bids opened Oct. 16 for a bridge at Pine street, over Chippewa River, which was estimated to cost $45,000, have been rejected.

CINCINNATI, OHIO.—City Engineer H. J. Stanley informs us that bids will probably be received for the superstructure of the Spring Grove avenue bridge before the end of the year.

The Board of Public Safety has been petitioned to issue $175,000 of bonds to build a viaduct over Crawfish Hollow from the hill at Grandin road and Delta avenue to Mount Tusculum.

CLEVELAND, OHIO.—Local reports state that the Pennsylvania has submitted a proposition to the city to abolish three crossings on Union street, by a bridge about 2,000 ft. long crossing the Pennsylvania and the Erie tracks.

DES JOACHIMS, QUE.—The Dominion Bridge Co., of Montreal, has the contract for the superstructure of the Interprovincial bridge over the Ottawa River, for which bids were opened on Oct. 19.

DULUTH, MINN.—Northern Pacific engineers are reported to have made an estimate for building a 1,200 ft. steel viaduct at Garfield avenue at a cost of $84,829.

KAMIAH, IDAHO.—The Secretary of War has approved the plans for the Clearwater Short Line Ry. bridge across Clearwater River, near Kamiah.

LAWRENCEBURG, TENN.—We are informed that bids are wanted by the Bridge Committee, on Nov. 15, for a steel bridge over Shoal Creek, one mile west of Lawrenceburg. The bridge is to consist of one 80-ft. span with 100 ft. of approach. F. M. Cannon, Chairman of the Committee, Lawrenceburg.

MARIETTA, OHIO.—Major Bixby, Corps of Engineers, U. S. A., stationed at Cincinnati, gave a hearing last week on the proposed bridge across the Ohio River at Marietta. The middle pier of the bridge will be on an island in the middle of the river. (Oct. 12, p. 679.)

MONTPELIER, VT.—Legislative authority has been asked for an issue of $15,000 bridge bonds.

MORRISTOWN, N. J.—Preparatory work is being done by the Delaware, Lackawanna & Western in Morristown, to allow the company to proceed with track elevation next year.

NEW LEWISVILLE, ARK.—We are informed that the St. Louis Southwestern Ry. has in contemplation renewal of a 300-ft. draw span over the Red River, about seven miles west of this place.

PETERBOROUGH, ONT.—The County Council has passed a by-law providing for issuing $15,000 of bonds for a county bridge.

PHILADELPHIA, PA.—A contract for the new steel bridge on the line of Coulter street, Germantown, over the Pennsylvania R. R. tracks, has been let to C. P. Weaver at $20,000.

PITTSBURGH, PA.—The contract for seven new bridges on the Allegheny Valley R. R. has been awarded to the American Bridge Co.

PRINCETON, WIS.—We are informed that the Chicago & Northwestern proposes to build a bridge over the Fox River at Princeton. It will be a 160-ft. draw span operated by hand.

ROSSLAND, B. C.—The contract for the Canadian Pacific bridge across the Columbia River from Sproat's Landing to Castlegar has been let to the Dominion Bridge Company, of Montreal. The bridge will be 550 ft. long and will cross the Columbia about a mile below West Robson.

SHEBOYGAN, WIS.—Reports state that bids will soon be wanted for a new bridge over the Sheboygan River at Pennsylvania avenue, in place of the present condemned structure.

TAUNTON, MASS.—The State Board of Railroad Commissioners has refused to allow the East Taunton Street Ry. to cross the New York, New Haven & Hartford tracks at grade. This decision will cause the street railroad to build a bridge.

TOLEDO, OHIO.—The advisability of issuing $750,000 of bridge bonds for a bridge at Jefferson street will be voted upon.

WATERVLIET, N. Y.—The State Superintendent of Public Works wants bids, until Nov. 15, for a plate girder bridge over the Erie Canal at 23d street, Watervliet.

WILKESBARRE, PA.—The Grand Jury has recommended 53 county bridges built at a cost of $15,000; 45 will be stone arches and 8 iron structures.

WORCESTER, MASS.—The city has filed its petition in the Superior Court for the appointment of a commissioner to proceed with the abolition of the grade crossings of the Boston & Albany and the New York, New Haven & Hartford roads, between the Union station and Cambridge street. This action is in pursuance of the recent act of the Legislature, authorizing the city and the railroads to proceed with the crossings referred to, without taking up at present the question of separating the grades on the lines entering the city from the north.

Other Structures.

BRAINERD, MINN.—The American Bridge Co. has the contract for the steel work for the new shops of the Northern Pacific R. R. at Brainerd.

BUFFALO, N. Y.—The Lehigh Valley has begun work on terminal improvements and alterations at Scott and Washington streets to accommodate visitors to the Pan-American Fair next year. The present passenger accommodations consist of a station and train shed about 160 ft. long. The shed will be extended 240 ft., making the total length 400 ft. Two additional platforms will be built. Tracks will be laid on either side of the shed. Contract for the entire work is let to Mosier & Summers.

The Buffalo Union Furnace Co. has been incorporated, with a capital of $1,200,000, to make iron and steel. Among those interested are: Frank S. Baird, Henry J. Pierce, Herbert P. Bissell, George C. Riley, J. Henry Metcalf, Samuel H. Baird, and William J. Jameson, all of Buffalo.

DU BOIS, PA.—Estimates are wanted for building and equipping a group of foundry buildings covering ten acres, at Du Bois. Apply to Wm. E. Bloodgood, 149 Broadway, New York.

HARRISBURG, PA.—President Harris, in the annual report of the Philadelphia & Reading, says that it is possible that an agreement can now be reached to get rid of a grade crossing by the main business street, the Pennsylvania Railroad and the Lebanon Valley R. R. of the P. & R., which are close together, and if this is done the company will erect new station buildings.

HOBOKEN, N. J.—The North German Lloyd Steamship Co. has contracted with the American Bridge Co. for material for three large steel piers in Hoboken, where the four wooden wharves formerly stood. The same company has also placed an order with the American Bridge Co. for building repair shops at Bremen, Germany, which will require about 800 tons of steel.

MONTREAL, QUE.—The Intercolonial Ry. is advertising for bids which will be received by D. Pottinger, General Manager, Moncton, N. B., Nov. 12, for building crib work protection walls, about 3,000 ft., on the Sydney & Point Tupper Division, and about 500 ft. on the Oxford & New Glasgow Division.

PHILADELPHIA, PA.—The structural steel work of the Germantown Junction station of the Pennsylvania R. R., is to be furnished by the American Bridge Co.

READVILLE, MASS.—The New York, New Haven & Hartford has let a contract to Horton & Hemingway, of Providence, R. I., for car repair shops at Readville, where the car shops of the Eastern District will be consolidated.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page xi.)

Central Railway Club.

The next regular meeting of the Club will be held at the Hotel Iroquois, Buffalo, N. Y., on Friday, Nov. 9, at 10 a. m. The Executive Committee will meet at 9 a. m.

H. Wade Hibbard, Professor of Mechanical Engineering of Railways and principal of the Graduate School of Railway Mechanical Engineering at Cornell University has accepted an invitation to read a paper. His subject will be "The Interlapping of the Railway Civil and Mechanical Engineer."

The subject for committee report and discussion is: "What channels of improvement afford an opportunity for securing greater efficiency in the present air-brake system." Committee: J. R. Petrie, J. W. Sheldon.

The Executive Committee will consider the advisability of establishing a Question Box and suggestions are invited.

PERSONAL.

(For other personal mention see Elections and Appointments.)

—Mr. D. W. Lum, who is Engineer of Bridges and Buildings of the Southern Ry., has been with that company and with the East Tennessee, Virginia & Georgia since 1885. He went to the East Tennessee line from the Chesapeake & Ohio, where he was Division Engineer, and has been connected with the Roadway and Engineering Departments since that time. He has been Chief Engineer of the East Tennessee, Virginia & Georgia for about eight years.

—Mr. Charles A. Parker succeeds Mr. C. L. Wellington as Commissioner of the Colorado Lines' Traffic Association at Denver. In his new position Mr. Parker will be Commissioner of the Colorado Southern, Denver and Rio Grande Association, Colorado Freight Bureau, Secretary of the Colorado Springs Local Passenger Bureau, Chairman and Secretary of the Colorado Terminal Lines Passenger Association, Secretary of the Denver Local Passenger Bureau and Secretary of the Pueblo Local Passenger Bureau. He entered the railroad service in 1881 as clerk in the freight department of the Santa Fe. In 1887 he became Assistant General Freight Agent and two years later General Freight Agent, same road. In 1889 he went to the Missouri Pacific as General Freight Agent and in October, 1891, became Freight Traffic Manager.

—Mr. B. R. Stephens, who has charge of the Purchasing Department of the new Toledo, St. Louis & Western at Toledo, Ohio, is 29 years old. He began railroad work in March, 1889, as a call boy for the Cincinnati, Hamilton & Dayton, continued with that company until December, the following year, and then went to the Chicago & Eastern Illinois, at Chicago, as chief operator in the general offices, remaining about two years. After occupying a similar position on the Western Division of the New York, Chicago & St. Louis at Fort Wayne, until August, 1893, he entered the service of the Ohio Southern as Secretary to the President and General Manager, and continued with that company until his recent appointment. He has served successively with the Ohio Southern as Assistant Superintendent, Purchasing Agent, Assistant to the Manager in Charge of Transportation and Maintenance under the Receivership, and, since March 4, 1899, when the road passed into the hands of the purchasers, with Benjamin Norton as General Manager, he has been Cashier and Paymaster.

ELECTIONS AND APPOINTMENTS.

Alabama Great Southern.—John A. Dodson has been appointed General Superintendent, with headquarters at Chattanooga, Tenn., effective Nov. 1. Mr. Dodson is also General Superintendent of the Western District of the Southern.

Atlanta & West Point.—Chas. A. Wickersham, heretofore Superintendent of the Alabama Great Southern, has been elected President of the Atlanta & West Point.

Baltimore & Ohio Southwestern.—E. R. Scoville has been appointed Superintendent of the Springfield Division, with headquarters at Flora, Ill., succeeding G. H. Groce, resigned. C. T. Hendrickson succeeds Mr. Scoville at Cincinnati, Ohio, as Superintendent of Telegraph. Effective Nov. 8.

Chicago & Alton.—Major Charles Hine has been appointed Assistant Superintendent of the Western Division, with headquarters at Roodhouse, Mo., in charge of transportation from Mexico to Roodhouse, and Bloomington to Godfrey, via Roodhouse. Effective Nov. 1.

Chicago, Milwaukee & St. Paul.—The office of Assistant General Freight and Passenger Agent at Des Moines, Iowa, has been abolished. Effective Nov. 1.

Chicago, Rock Island & Pacific.—D. H. Speakman has been appointed General Foreman, with headquarters at Horton, Kan., succeeding T. E. Merritt, resigned.

Deckerville, Osceola & Northern.—E. W. Mills has been appointed Auditor and General Freight Agent, succeeding F. C. Fletcher.

Emporia & Gulf.—H. C. Burtis has been appointed Auditor.

Erie.—L. S. Miller, heretofore General Manager of the Seattle & International, has been appointed Assistant to the President of the Erie, with headquarters at 21 Cortlandt street, New York City.

Fort Worth & Denver City.—M. H. Mills, heretofore Trainmaster, has been appointed Assistant to General Superintendent J. V. Goode.

Great Northern (Canada).—W. A. Kingsland has been appointed Auditor.

Illinois Central.—M. D. Royer, heretofore Assistant Auditor of Freight Receipts, has been appointed Auditor of Freight Receipts, succeeding F. Fairman, promoted.

Kansas City Southern.—At a meeting of the stockholders, held Nov. 3, the following new Directors were elected: L. Greer, G. J. Gould and Edwin Gould, New York; S. W. Fordyce and H. C. Pierce, St. Louis.

Lake Shore & Michigan Southern.—We are informed that the statement, made by a contemporary, that G. P. Smith had been appointed Assistant to the Chief Engineer, is incorrect.

Lexington & Eastern.—R. E. Tod has been elected President, succeeding the late H. C. McDowell.

Louisville, Evansville & St. Louis.—See Southern.

Mexican Central.—G. O. Perkins has been appointed Superintendent of Telegraph, succeeding Geo. C. Sperry, assigned to other duties. Effective Oct. 25.

Minneapolis, St. Paul & Sault Ste. Marie.—George R. Huntington, heretofore Superintendent, has been appointed General Superintendent, with headquarters at Minneapolis, Minn. Effective Nov. 1.

Nevada-California-Oregon.—J. H. Bennett has been appointed General Freight and Passenger Agent, and F. D. Duncan Assistant General Freight Agent. Effective Oct. 22.

New York Central & Hudson River.—J. B. Stewart, heretofore Division Superintendent of the West Shore at Weehawken, N. J., has been appointed Superintendent of the Pennsylvania Division of the N. Y. C. & H. R., with headquarters at Corning, N. Y., succeeding A. G. Palmer, resigned. J. H. Hustis succeeds Mr. Stewart on the West Shore, and M. Bronson succeeds Mr. Hustis as Superintendent of the Harlem Division at White Plains, N. Y. Effective Nov. 1.

Peoria & Pekin Terminal.—G. W. Talbot has been appointed Traffic Manager.

Pittsburg & Western.—The jurisdiction of the following officers of the Baltimore & Ohio, with headquarters at Baltimore, Md., and Allegheny, Pa., has been extended over the P. & W: Daniel Willard, Assistant General Manager; William Gibson, General Superintendent Transportation; J. R. Kearney, Superintendent Car Service; J. M. Graham, Chief Engineer; J. N. Barr, Mechanical Superintendent; E. H. Bankard, Purchasing Agent; Charles Selden, Superintendent Telegraph, and D. A. Williams, Superintendent Stores. Effective Nov. 1.

Southern.—Geo. C. Smith, heretofore President and General Manager of the Atlanta & West Point, has been appointed General Manager of the St. Louis-Louisville Division, which includes the Louisville Division and the old Louisville, Evansville & St. Louis Consolidated. J. S. B. Thompson, heretofore Assistant General Superintendent, will continue in Atlanta in the discharge of duties of wider scope, with the title of General Agent. J. C. Moore, Auditor of Disbursements, having resigned, H. H. Laughton, Chief Clerk, will, until further notice, be in charge of that department.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

ATCHISON, TOPEKA & SANTA FE.—Extensive improvements are reported under way between San Diego, Cal., and Santa Anna.

BALTIMORE & OHIO.—Right of way is reported secured for a branch from a point on the main line in Maryland, a few miles west of Piedmont, W. Va., to run north up the Savage River to Big Run.

BLACK RANGE.—A contract conditioned on the presidential election is reported made for building this line from Magdalena, N. Mex., on the Atchison, to run south about 90 miles to Chloride. Colonel R. E. Twitchell, of Santa Fe, N. Mex., is President. (Construction Supplement, July 27, 1900.)

BOSTON & MAINE.—No surveys have been made for the proposed electric line from Concord, N. H., to Nashua. (Oct. 12, p. 680.) The company recently filed a petition for authority to build. (Official.)

BRITISH COLUMBIA ROADS.—An agreement has been entered into between the corporation of the city of Victoria and Alexander Scott Innes of that city, as trustee, for building and operating a railroad over the city streets to connect the Victoria & Sydney with the Esquimalt & Nanaimo; to operate car ferry service between the Victoria & Sydney Ry. Co.'s line and a convenient point at or near the mouth of the Fraser River; to build and operate a railroad from a point at or near the mouth of the Fraser River on the south side and extend east through the districts of Delta and Surrey to a connection with the New Westminster Southern, and to such points further east as may be determined by the company. Permission is granted to amalgamate with the Great Northern and to enter into traffic and other arrangements with that and other companies. Building is to be begun within six months.

CANADIAN PACIFIC.—The company is reported about to build a spur 4½ miles long from Grand Forks, B. C., to connect at the International boundary with a railroad to Republic.

CHATEAUGAY & NORTHERN.—The Dominion Government has granted a bonus of $3,200 per mile for 42 miles of this line, to run from Hochelaga Ward, Montreal, Que., through L'Assomption to Joliette. H. H. Melville, of 308 Sears Bldg., Boston, is interested. (Oct. 26, p. 711.)

CHICAGO & NORTHWESTERN.—Surveys are reported in progress for a branch from Antigo, Wis., west about 30 miles to Merrill.

COWEN & GREENBRIER.—This company has been organized in West Virginia, to build a railroad from Cowen, on the Baltimore & Ohio, in Webster County, to run east about 30 miles up the Gauley River and thence to the Greenbrier River. James H. McCreery, of Pittsburgh, Pa., is President; Colonel Hugh Sterling, of Wheeling, W. Va., is Vice-President, and A. C. Hays, of Pittsburgh, Superintendent in Charge of Construction.

ELIZABETH CITY & WESTERN.—The company is reported taking preliminary steps for building from Elizabeth City, N. C., on the Norfolk & Southern, northwest about 40 miles to a connection with the Seaboard Air Line. C. E. Kramer, of Elizabeth City, is President and General Manager. (Construction Supplement, July 27, 1900.)

EL PASO & NORTHEASTERN.—An officer writes that no arrangements are being made for new building. The company is making some surveys toward the north, and it is possible that later it may extend its line, but nothing definite is yet decided.

ESCANABA & LAKE SUPERIOR.—The company is reported to have bought 25,000 acres of timber lands in Marquette and Delta counties, Mich., to which an extension about 25 miles long will be built.

GREAT FALLS & BILLINGS.—Under this title the road recently referred to under Montana Roads (Oct. 26, p. 712), is proposed from Billings, on the Northern Pacific, northwest about 200 miles to Great Falls on the Great Northern. It is stated that preliminary surveys will be begun within a few weeks and that the motive power is to be electricity. James McNaughton, formerly General Counsel for the Northern Pacific, and L. K. Kinney, of the New York Trust Co., are among the promoters.

KENTUCKY ROADS.—An officer of the North Jellico Coal Co., of Louisville, Ky., and Bertha, Knox County, confirms the statement that the company is building a coal road 4½ miles long to connect with the Louisville & Nashville at Woodbine. The work is very light. Track laying will be done by the L. & N.

LONG ISLAND.—The company is reported making extensions at Sag Harbor, L. I.

LOUISIANA ROADS.—The Salmen Brick & Lumber Co., of 722 Common street, New Orleans, and Slidell, La., writes that it is building the line recently referred to from Bayou Liberty northwest about six miles to Bayou Lacombe. The work is being done by the company's forces and about 25 men are employed. Some 3½ miles are graded. (Oct. 26, p. 712.)

MISCELLANEOUS COMPANIES.—The Lackawanna & Wyoming Valley Rapid Transit Co. was incorporated in New Jersey, Oct. 30, with a capital stock of $2,850,000, to equip and operate railroads and to develop compressed air and electric power.

MISSOURI PACIFIC.—Surveys are reported in progress for the extension considered some time ago from Menden, Mo., south about 30 miles to Joplin.

NORTHERN PACIFIC.—The company, according to report, has authorized the spending of about $300,000 for terminals at Portland, Ore.

OREGON SHORT LINE.—The Utah Construction Co. has taken a contract for a branch about three miles long near Kemmerer, Wyo. This may be the spur recently referred to in this column. (Oct. 12, p. 680.)

ORFORD MOUNTAIN.—Building is reported in progress on the extension of this line from Kingsbury, Que., north across the St. Francis River to Richmond. (March 31, 1899, p. 238.)

PENNSYLVANIA COMPANY.—An officer writes that the company at present is not considering the question of extending the Apple Creek branch of the Ashland & Wooster recently bought, as reported. (Nov. 2, p. 732.)

RIO GRANDE WESTERN.—Arrangements are reported completed for a branch from Bingham, Utah, to connect with the United States Bingham Copper and Gold mine and adjacent mines.

ST. LOUIS SOUTHWESTERN.—An officer writes that preliminary surveys are in progress for a proposed extension from Gatesville, Tex., northwest to Hamilton. No decision has been arrived at as to building. (Oct. 26, p. 712.)

SEABOARD AIR LINE.—Location has been made for 12 miles and the contract is to be let at once for the line from McBee, S. C., north about 40 miles to Monroe, N. C., on another branch. The work is very light. (Oct. 26, p. 712.) The maximum curves are 4 deg., and the maximum grades 1¼ per cent. (Official.)

SOUTHERN INDIANA.—A branch will be built, according to report, from Jasonville, Ind., on the extension to Terre Haute, to run west about seven miles to Jackson Hill, on the Evansville & Terre Haute line.

SOUTHWESTERN OF ARIZONA.—This company has been incorporated in Arizona, with a capital stock of $250,000, to build a line from Don Luis, on the Arizona & Southeastern, to run southwest about 22 miles to a point on the Mexican boundary line. The incorporators are: W. Douglass, S. W. French and R. C. Morgan, all of Bisbee.

TENNESSEE CENTRAL.—Noel & Thompson, of Chattanooga, have the contract for a branch from Johnson's Stand, Tenn., to the coal lands of the Campbell Coal Co., of Atlanta, Ga., near Woody, Tenn., nine miles. (Aug. 31, p. 588.)

TOLEDO & CHICAGO TRANSFER.—This company was organized under the Indiana State law Nov, 1, with a capital stock of $100,000, to build a railroad across the State from the eastern to the western boundary through the counties of Newton, Jasper, Pulaski, Fulton, Kosciusko, Whitley and Noble. The incorporators are: J. A. Hamilton, of White Cloud, Mich., and William McIntosh and J. B. Westcott, of Goodland.

WISCONSIN CENTRAL.—An extension is proposed, according to report, of the tracks and switch yards at Manitowoc, Wis., toward the Little Manitowoc River.

WYOMING ROADS.—The Utah Construction Co. has the contract for building a line about two miles long in Kemmerer, Wyo., for the Kemmerer Coal Co.

GENERAL RAILROAD NEWS.

CHICAGO & GRAND TRUNK.—The property was sold at auction, Oct. 31, to representatives of the Grand Trunk for $5,708,704.04, of which $5,437,000 covers the first mortgage and the rest interest. The property is to be reorganized as the Grand Trunk Western. (Oct. 12, p. 680.)

CHICAGO & NORTHWESTERN.—Negotiations are being completed, according to report, for the control of the Marshfield & Southeastern, which is to form a part of the extension from Princeton, Wis., northwest to Marshfield. (Railroad Construction, Oct. 19, p. 696.)

CHICAGO GREAT WESTERN.—The company has given notice of its intention to issue $4,300,000 additional 4 per cent. debenture stock, to retire car trusts and other indebtedness.

CHICAGO, PEORIA & ST. LOUIS.—The receivers of this company and of the St. Louis, Chicago & St. Paul have been discharged.

COLUMBUS, LIMA & NORTHWESTERN.—This company was incorporated in Ohio, Nov. 3, with a capital stock of $10,000, as successor, it is said, of the Columbus Northwestern. The proposed line is from Columbus north through the counties of Allen, Auglaize, Hardin, Logan, Union, Delaware, Champaign, Madison and Franklin to Lima. Plans are in progress to extend the Columbus Northwestern to these points. (Railroad Construction column, Oct. 5, p. 662.)

ERIE.—Contracts are signed for the transfer of all passenger and freight trains entering the city of Springfield, Ohio, over the tracks of the Ohio Southern. The arrangement goes into effect this month.

FITCHBURG.—Preferred stockholders who dissented to the lease of the property to the Boston & Maine have asked for an appraisement of their stock under the act for leasing the road. The hearing will probably not occur before the first Tuesday in December.

HOUSTON & TEXAS CENTRAL.—First mortgage bonds for $165,000 have been called for payment at 110 and accrued interest, upon presentation at the company's office, Mills Bldg., New York City, interest to cease Dec. 31.

The Texas Railroad Commission has approved of the proposition to issue first mortgage bonds to the amount of $1,104,000 on the old Waco & Northwestern. (Nov. 2, p. 702.)

KANSAS CITY SOUTHERN.—The Harriman syndicate has obtained full control of this property and a change in the voting trustees gives the syndicate a majority. (Sept. 21, p. 628.)

LOUISVILLE, EVANSVILLE & ST. LOUIS.—This line will be sold under foreclosure at Huntington, Ind., Nov. 22. (Sept. 28, p. 644.)

OMAHA & ST. LOUIS.—Over 1,600 of the 2,376 first mortgage bonds have been deposited with the Union Trust Co., under the bondholders' agreement. On Nov. 1 James Hopkins retired as second receiver, leaving Chas. H. Chappell as sole receiver. This was under the order of Judge Thayer. (Nov. 2, p. 732.)

PENNSYLVANIA.—The directors, on Nov. 1, declared an extra dividend of 1 per cent. in addition to the regular semi-annual dividend of 2½ per cent., which, if continued, puts the stock on practically a 7 per cent. basis.

RUTLAND.—Governor Stickney, of Vermont, has signed the bill permitting the company to absorb by consolidation its subsidiary properties, including the Bennington & Rutland, the Rutland-Canadian, the Rutland & Noyan and the Ogdensburg & Lake Champlain; also the Rutland Transit Co. (Aug. 31, p. 588.)

ST. LOUIS, CHICAGO & ST. PAUL.—See Chicago, Peoria & St. Louis.

SEABOARD AIR LINE.—A circular recently issued shows that the gross earnings for the year ended June 30 last on 2,358 miles were $9,578,286. The net earnings after deducting operating expenses and taxes, were $2,618,564. The ratio of operating expenses to gross earnings was 72.66 per cent. These earnings include all the lines of the old Seaboard Air Line, the Florida Central & Peninsular and the Georgia & Alabama. The gross and net earnings for the preceding year were $9,065,461, and $2,499.682 respectively. (Nov. 2, p. 732.)

TALLAHASSEE SOUTHEASTERN.—R. L. Bennett, Vice-President and General Manager, is reported to have obtained control of this line, which is projected from Tallahassee, Fla., southeast about 100 miles to the Suwanee River and thence to Tampa. The line was completed to Wacissa, 20 miles, last year. (Construction Supplement, July 27, 1900.)

VICKSBURG, SHREVEPORT & PACIFIC.—November coupons from the $1,323,000 prior lien 6s of 1885 will be paid promptly at maturity. Of the $4,000,000 first mortgage 6s of 1881, $106,000 did not assent to the issue of the prior lien bonds and these have received their interest regularly. The remaining issue assenting is held, except $3,692,000, by the Alabama, New Orleans & Texas Pacific Junction which has received no interest thereon for many years, the amount of coupons due unpaid and unfunded being $2,320,000. The interest on about $200,000 of assenting bonds held by the public was paid until July last, when the company, being in receiver's hands, their coupons went to default. (July 6, p. 472.)